Electric Railway Journal

A CONSOLIDATION OF STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XXXIX NEW YORK, SATURDAY, JANUARY 20, 1912 No. 3

PUBLISHED WEEKLY BY

McGraw Publishing Company

JAMES H. McGRAW, Pres. C. E. WHITTLESEY, Sec'y and Treas.

239 West 39th Street, New York

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK

CHICAGO OFFICE.....1570 Old Colony Building
CLEVELAND OFFICE.....1021 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, $3.00 per year; Canada, $4.50 per year; all other countries, $6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Wednesday, 9 a. m., of the week of issue.

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Entered as second-class matter at the post office at New York, N. Y.

Of this issue of the ELECTRIC RAILWAY JOURNAL, 8500 *copies are printed.*

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JOINT TIMBER-TREATING PLANTS

The discussion on "Co-operative Timber Treatment Plants" at the June, 1911, meeting of the Central Electric Railway Association, which was referred to editorially in the ELECTRIC RAILWAY JOURNAL of July 29, 1911, has been crystallized into practical form by Frank P. Smith in his paper on wood preservation, published elsewhere in this number. Mr. Smith estimates that the apparatus for a common plant would cost $100,000 and that this equipment would care for railways of the association aggregating 3800 miles of track with about 8,550,000 untreated ties. At the end of five years the reduction in the number of ties requiring treatment would make this plant available for the preservation of poles and accessories, bridge and trestle timbers, fences and other way lumber. The proposal put forward by Mr. Smith is in line with progress and deserves thorough study. The desirability of timber preservation is no longer debatable, but its practicability for the small company, so far as pressure treatments are concerned, is still an open question. A costly creosoting plant is beyond the means of most railways, but if a company should purchase the treated wood it has no absolute assurance that the goods are as represented. The success which the member companies of the Central Electric Railway Association have had in working out an interline ticket agreement augurs well for the possibility of extending such united effort to engineering matters like timber preservation. Even if the operation of a common plant should be found to offer insuperable obstacles, the same end might be served by the creation of an inspection bureau which could send its men from one treating plant to another in accordance with the requests of member companies.

SUMMER EQUIPMENT

Electric railway companies have devoted a great deal of thought to methods of reducing the peak load in their power stations and in their transportation departments. Ways to increase the load factor are eagerly sought, as they tend toward economy of production and operation. But in one direction many companies give but little consideration to the distribution of the peak load. We refer to their purchases, particularly to their purchases of large equipment, such as cars, which cannot be kept in stock and which necessarily take some time to construct. Now, it is obvious that any additional expenses to which the manufacturer of cars is put to supply an order must be reflected in his charges to that customer, and it is equally obvious that rush orders for equipment of this kind cannot be fulfilled with maximum economy. The conditions in a car shop, so far as this situation is concerned, are not greatly different from those on a railway. The companies prepare themselves as regards their labor and supplies to take care of the average maximum demand which they may reasonably expect, but supplies which have to be secured in a hurry must be purchased from jobbers rather than from wholesalers. For instance, steel for car construction costs $5 more per ton when bought from a jobber than when purchased directly from the mill. The same principle holds in labor. Work done during slack times can be turned out much more cheaply than when the

shop hands have to be paid overtime. Nevertheless, many railway companies will take more time in their drafting rooms in preparing drawings of the cars that they wish than they are willing to allow the car builder to construct these same cars. Too often orders for sprinklers and other cars desired for summer are postponed until spring and then ordered for quick delivery, and the same conditions prevail on the same systems for the purchase of sweepers and snow plows which are not ordered until the fall months. Then a premium, or what amounts to a premium, must be paid, so that the equipment will be secured in time. This is a case in which the dilatory person pays—any pays highly—for his tardiness. With the increasing time and energy which are being paid to economy the matter is worthy of consideration, especially at this time of the year, when many purchases are made.

BUILDING DESIGN AND INSURANCE

The fact that insurance rates are almost totally dependent on the way the engineer has complied, or failed to comply, with the Underwriters' requirements in a general shop layout and building design should influence designers to make a more careful study of the Underwriters' code. Owing either to ignorance or a failure to comply with this code, a great many railways are paying from one-third to one-half more insurance on their buildings than is absolutely necessary. In rating any risk the underwriter takes the following five general characteristics into consideration : Construction, exposure, occupancy, hazards and protection. The way engineer has practically no control over the occupancy, but he can carefully adjust his location and design to conform to the other four requirements. There are a great many very simple, inexpensive construction features which, when complied with, will surprisingly reduce the total insurance on a large property. For instance, if the building is of mill construction, the simple application of whitewash or cold-water paint on the inside walls and ceiling materially reduces the insurance rate and at the same time increases the efficiency of the lighting, and so results in more efficient labor. Oil stored in a fireproof oil house within the building reduces the base rate approximately 20 cents, and if it is stored in a separate building provided with a pit or tank of sufficient size to hold all the oil in storage the rate is still further reduced. The application of an Underwriters' specification tin-clad door in place of an ordinary wooden one in a partition acting as a fire wall, or between two sections one of which contains a more combustible material in storage than the other, reduces the base rate approximately 20 cents. The addition of water plugs, hose and pails filled with sand to the carhouse equipment reduces the rate more than 5 per cent. It will be found in every case mentioned, and in others too numerous to record, that the reduction in rate will pay for the additional protection in a comparatively short time. Finally, the failure to use proper care in cleaning up around a carhouse—that is, in the removal of all combustible material —may, if the insurance inspector is observing and adheres closely to the Underwriters' requirements, raise the base rate as much as 25 cents. Cleanliness is as much of a virtue in carhouse management as elsewhere.

TRAILER OPERATION IN PITTSBURGH

The article on "Trailer Operation in Pittsburgh," published elsewhere in this issue, is of particular interest because it recounts the traffic conditions and operating practices of a street railway which has done pioneer work in handling the trailer question with the care that it deserves. With the exception of Denver and a few other cities, trailer service on American street railways has generally been conducted in a half-hearted way. Necessarily, the results of such indifferent operation have also been equivocal. The bald truth is that the public has never taken kindly to the use of defunct horse cars for electric trailers, and even well-preserved single-truck cars have been scorned by communities which were familiar with double-truck cars. It is no wonder, therefore, that the introduction of a comfortable car which was specifically designed for use as a trailer should receive the approbation of the public in Pittsburgh or elsewhere.

From the traffic-handling standpoint the most meritorious features of the Pittsburgh trailer are the low step obtained by using 22-in. wheels and the better distribution of passenger load afforded by employing center doors. From the engineering standpoint, however, the best feature of this car is its lightness, for this has made it practicable to haul a trailer carrying sixty-two seated passengers without imposing a dangerous load on the equipment of the motor car. The four motors, themselves, are rated at only 50 hp to 60 hp each, but their commutating-pole design and flameproof insulation have enabled them to carry the rush-hour burden without damage, even when running over steep lines.

From this experience, the Pittsburgh management feels that it was amply justified in preferring this form of trailer operation to trains of motor cars. It is obvious that the latter are more expensive in first cost, in operation and energy consumption. The principal advantage of the all-motor-car train is its superior acceleration, but the price demanded for this quality has been for exploitation only one or two hours a day.

Some railway men object to city train operation in any form because of its apparent tendency to slow down the schedule. This objection appears plausible, yet in practice it will be found that a heavily loaded single car is likely to make as many stops as a two-car train to discharge and take on passengers. In Pittsburgh, for instance, a 52-minute motor-car run was covered by a motor and trailer car train in but 3.6 minutes more than by a single car. One important thing in making trailer operation successful is to provide good facilities for train make-up in order to avoid appreciable interference with regularly scheduled cars. For this reason loops are desirable, though not essential. In Pittsburgh, when the trailers are attached to the motor cars in the beginning of the rush hour, the motor cars are delayed not more than two or three minutes each. This is an excellent record, but it will be bettered when all of the cars used in this service are equipped with automatic couplers.

The recent development of a simple multiple-unit system for city cars puts a new light upon the trailer problem. Heretofore there have been, broadly speaking, but two

opportunities: the single motor car and the motor car and trailer. Mr. Davis, at the Milwaukee meeting of the Wisconsin Electrical Association, put in a strong plea for that type of two-motor-car train in which each car is equipped with two motors. Such a combination possesses several manifest operating advantages over the motor-car-and-trailer plan, and the arguments in favor of it are worthy of consideration.

THE GOSPEL OF EFFICIENCY IN RAILWAY SHOPS

There is much inspiration for the master mechanic of the small shop in E. P. Doyle's paper on the shop methods of the Aurora, Elgin & Chicago Railroad, which appears elsewhere in this issue. Mr. Doyle lays no claim to the imposing title of efficiency engineer, but his plain, unvarnished tale of problems met and overcome proves how a spirited shop organization can develop within itself the highest degree of usefulness. By inference, also, it points out the mistake which would be made by a small company if it should adopt improved shop tools unless it has the opportunity to exploit them to their full capacity within a short time. There is no wisdom, for instance, in buying a modern wheel lathe at a high price when the average number of wheel sets turned does not exceed three or four a day. This means that the efficiency of many railway shop tools does not really lie in their speed as much as it does in their adaptability for intensive use for various purposes. A specially designed slotter may dispose of commutators somewhat faster than a slotting attachment to a lathe or shaper, but its use is not true economy if either of the costlier tools has long periods of idleness. In short, the most efficient small shop is not the one with a big array of specialized little-used tools, but one where a few standard machines have been endowed with protean qualities.

A second important point of Mr. Doyle's paper is the division of labor in such manner that some men can be shifted to the most burdened department. A baseball team is composed of nine specialists, but there are always one or two utility men for emergencies. Unlike substitute players, however, the utility man in a railway shop ought to be of better stuff than the regulars. The man who is ready for any task at any time is the one who should be next in line for promotion. The policy of selecting foremen from among such employees is in successful use on a large Eastern railway which has far less need for all-around men than the small shop.

Another important point brought up by Mr. Doyle lies in the suggestion that the men will be more careful in using or discarding material if they know its value in dollars and cents. Although this suggestion has been made before, it has not been adopted as widely as its merits deserve. A railway is not a merchandise-selling organization which must keep its purchase prices secret. There can be no harm in having the men understand that the price of a fitting, which weighs perhaps only a few ounces, includes inventors' royalties, manufacturing and selling expenses, transportation charges and other costs than that for the mere metal.

However, after all that has been said, the crown of efficiency is esprit de corps, the spirit of devotion between master and men for a common cause. What the superintendent of a small shop may lack in money and machinery can be more than balanced by the enthusiasm which his own personality and loyalty can create in his men.

RIGHT-OF-WAY FENCE MAINTENANCE

Probably no parts of the physical portion of an interurban railway receive less attention and have smaller sums of maintenance money spent on them than the right-of-way fences and cattle guards. The fact that interurban companies are facing a problem which is so unsatisfactorily covered by state legislation is very evident from the evidence submitted in legal cases for killing or injuring stock. The law in the Central West provides a statutory height for a right-of-way fence, and further requires that the cattle guards must be so constructed that they will turn all stock. Whether these legal requirements have been complied with or not makes very little material difference; the results are nearly always the same. The jury will find that the railway company's car killed the stock, and the only question is how much is the company to be assessed for the loss. With this condition of justice staring a company in the face, is it desirable to maintain the fences and cattle guards? We think it is, although it has been found impossible economically and practically to build a fence or cattle guard that will turn all stock.

The problem resolves itself into one of using the most practical arrangement and of properly maintaining it.

With both steam and electric lines the materials used and the methods of construction have changed in the past ten years to more efficient types. The employment of either round or half-round cedar posts spaced at 16½ ft. seems to be a standard. The fencing has changed from the simple barbed wire to an all woven wire fence, and of late the combination of the two seems to give the best results. We have also noted that the woven wire fence manufacturers have taken the initiative in improving the quality of their product by replacing the small stay wires which would rust out in a short time and require the substitution of the woven wire by wire of the same gage as that used for the longitudinal strands. This alteration in the size of the stay wire slightly increases the first cost, but will double the life of the fence and therefore result in material maintenance reduction.

The introduction of a non-corrosive tubular steel post is another step in advance, particularly on steam roads and interurban lines paralleling steam roads, where fires in the grass and weeds along the right-of-way may be expected. The cattle guard which seems to give the most satisfaction is varied in type, but in general provides a space of unsafe footing of such length as to make jumping over the guard impossible for ordinary stock. In this period of financial stringency and increased operating costs it behooves managers and engineers to make small savings as well as large ones. A small amount of money devoted to the careful maintenance of fences and cattle guards will reduce the stock killed and injury suits. It will make the right-of-way less accessible to trespassers and will reduce the opportunity for the presentation of evidence that fences are not properly maintained.

Trailer Operation in Pittsburgh

Conditions Have Made Two-Car Operation During Rush Hours a Necessity in Pittsburgh—The Use and Construction of the Steel Motor Cars and Steel Trailer Developed for This Service—Painting Specifications Are Also Appended

The ever-growing intensity of rush-hour travel in American cities, both large and small, has brought prominently to the fore the question of two-car operation. The Pittsburgh Railways has given this problem much attention for several years past with the result that it is now operating more and larger trail cars than any other street railway in this country. The reason for this development will be best understood by referring to the map of the outbound passenger movement in Pittsburgh and vicinity which was published on page 269 of the Electric Railway Journal for Aug. 13, 1910. This map, which was a part of B. J. Arnold's "Report on Financial and Operating Records of the Pittsburgh Railways," shows that the delta of the Allegheny and Monongahela Rivers, which constitutes the business section of Pittsburgh, carries a highly concentrated traffic. Furthermore, the intersection of the streets in this district adds greatly to the congestion and difficulty of car operation. The large amount of foreign vehicular traffic is also a most obstructive element. At five of the most prominent downtown corners checks have been made, and these show that the average ratio between wagons and cars is three wagons for each car. This proves that the congestion is in a greater measure due to wagons than to cars. It is apparent that if the cars were run as single units it would not be possible to handle a line of traffic as quickly as when trains are used, because each unit requires a certain time to start and stop. One object of trailer operation, therefore, was to accelerate the service in the downtown terminal district by minimizing the backing up of traffic to the preceding intersections.

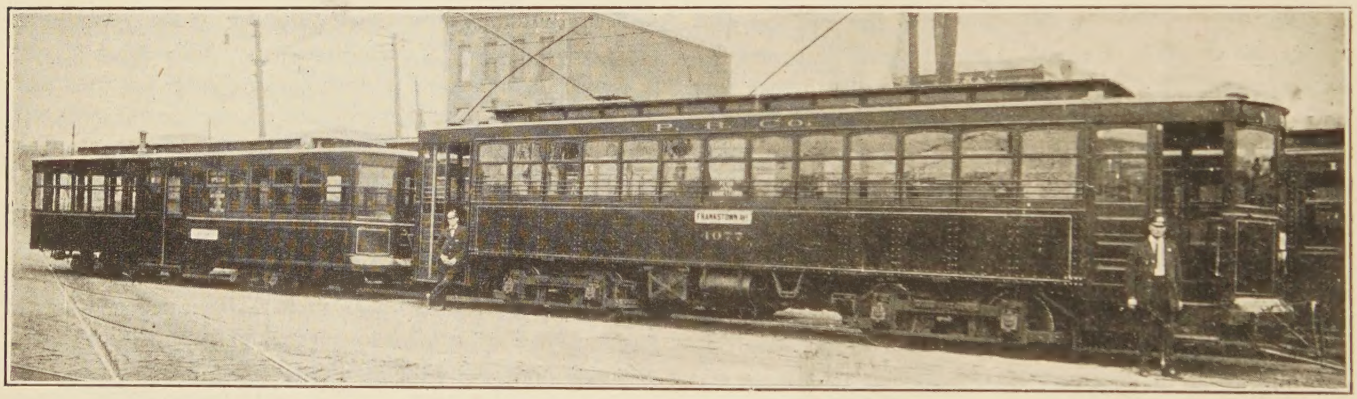
Another peculiarity of the traffic conditions in the Pittsburgh business district is the tendency of the public to go to certain corners to board the cars instead of using the nearest corner. The principal boarding points are Sixth Avenue and Smithfield, Fifth Avenue and Smithfield, Fifth Avenue and Wood, Sixth Avenue and Wood, Fifth Street and Liberty, Sixth Street and Liberty, and Sixth Street and Penn Avenue. Practically the entire downtown home-going travel must be taken out in forty minutes.

TRAILER SERVICE

The first operation with trailers began some seven or eight years ago, but, although the company did not follow the customary policy of using old car bodies for trailer service, the public still favored the motor cars because the trailers were single-truck cars. This preference for the motor car has been eliminated, however, by the purchase of double-truck steel trailers, which are actually more popular than the motor cars because of the low step permitted by the use of 22-in. wheels. This latter feature makes the trailers especially satisfactory to women. It is not uncommon, in fact, to see the steel trailer loaded before the motor car.

The management has made many observations of the time required to board the different types of cars used in Pittsburgh. It has proved practically impossible to get accurate comparisons, however, because the character of the passenger load differs greatly, according to the time of day and to other conditions. For instance, during the middle of the day the loading is slow because many of the passengers are women shoppers who are encumbered with bundles. Again, men will jump on a car before it has come to a full stop, whereas women always wait until the car is standing still. The general conclusion drawn from the tests made by the company was that the difference between cars which have their doors closed while running and those which have their doors open while running was not great enough to affect transportation conditions materially. It was also noted that about 28 per cent of the passengers leave by the rear exit and about 72 per cent by the front exit.

There are now in operation about 120 single-truck wooden trail cars and fifty double-truck steel trail cars.



Pittsburgh Trailer Operation—Standard Train Ready for Service

The latter, which were installed late in 1910, are hauled by steel motor cars, of which 130 are in use.

The flexibility of the trailer operation is shown by the fact that it is used successfully on lines where single motor cars are also operated. On the Frankstown Avenue line, for example, a 60-second headway is maintained for a distance of about 2 miles out of the terminal district. At present fourteen steel trailers are operated on Frankstown Avenue, fifteen on Hamilton Avenue, fifteen on Forbes Street, four on the Avalon division and one on Second Avenue.

Some particulars of the prepayment motor cars and steel trailers as designed by P. N. Jones, general superintendent Pittsburgh Railways, were published in the issues of the Electric Railway Journal for Oct. 15, 1910, and Dec. 10, 1910, respectively. The following paragraphs, however, present a more detailed description, preceded by brief descriptions of the tests made to determine the train service requirements and the method of making up trains for the rush-hour traffic.

TRAIN SERVICE REQUIREMENTS

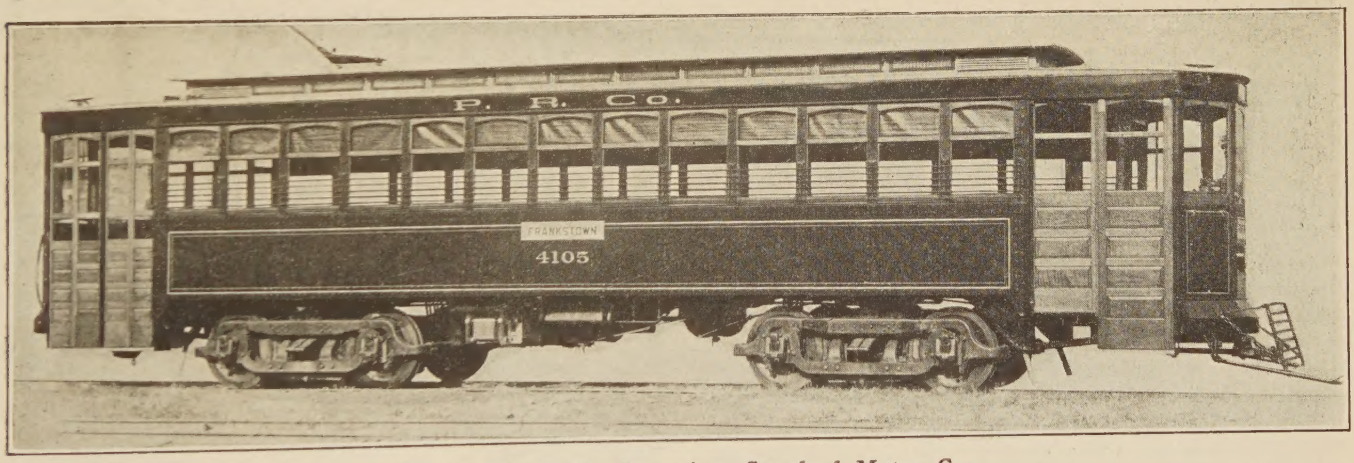
The requirements for train service were determined by a test made late in 1910 on the Frankstown Avenue line by Clarence Renshaw, representing the Westinghouse Elec-

tric & Manufacturing Company, and F. R. Phillips, superintendent of equipment Pittsburgh Railways. These tests were made to determine the proper capacity of the motors. The weight of the motor car was 47,500 lb. and of the trailer 22,300 lb., giving a total weight of 114,800 lb. when figuring upon a maximum load of 250 passengers. It was found that the most efficient motor equipment should consist of four 306-C.D. interpole motors, which are rated at 60 hp each on 600 volts and 50 hp each on 500 volts. These motors are capable of giving an acceleration of 0.83 mile per hour per second on a 6 per cent grade. The gear ratio of 15:69 was selected to maintain an average schedule speed of 9.7 m.p.h. It was found, on account of the commutating-pole design and flameproof insulation of the motor, that when starting from 25 deg. C. it was possible to operate safely for an hour with a rise of 85 deg. C. This performance exceeded the builder's guarantee and, in the opinion of the railway, gave ample justification for operating trailers in preference to motor-car trains.

Several interesting comparative tests were made on the Frankstown Avenue line between the running times of cars and trains. In one case the train made the trip in 55.6 minutes, which was only 3.6 minutes more than the time of a single car. The average number of stops on this route, including slow-downs, was 9.7 per mile, and the average length of stop was 6.8 seconds. The energy consumption of a train run at 8.9 m.p.h. schedule speed was 147 watts per ton mile in one test and 137 watts per ton mile in another test.

In deciding upon this class of train operation the company also went into the possibility of applying it over the lines throughout the city. A special study was made of grades and a dummy car was operated throughout the system to check all intersections and curves where interferences might be offered. The result of this investigation was that many curves were straightened, poles and other obstructions removed, and the system was otherwise improved. Many wyes, loops and crossovers have been constructed to provide for the adoption of double-truck, single-end operation, but it was found that in many districts on the system it would be practically impossible to operate these trains because of excessive grades and insufficient clearances.

Pittsburgh Trailer Operation—Head-on View of Motor Car



Pittsburgh Trailer Operation—Standard Motor Car

THE MAKE-UP OF TRAINS

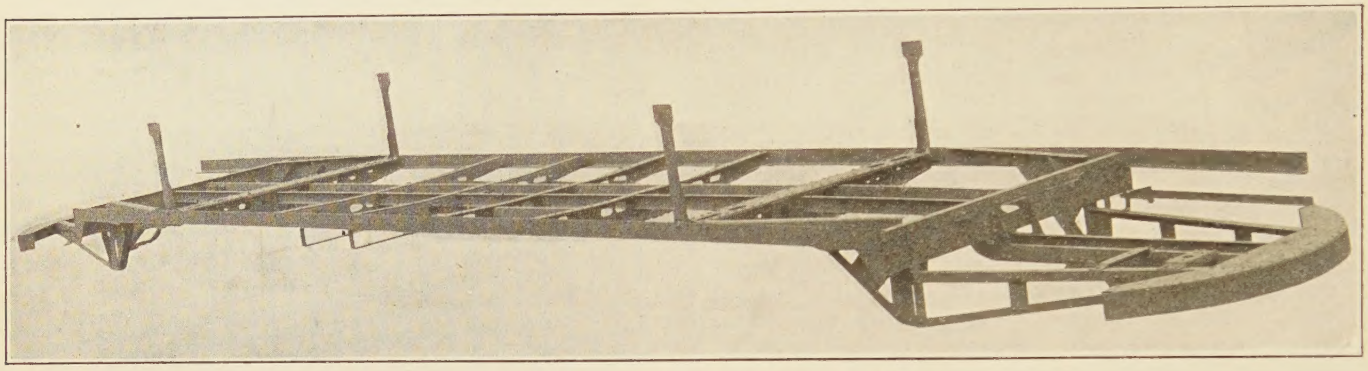
The motor cars and trailers are made up into trains for the evening service a few minutes after four o'clock at several different places. At Homewood, where the pick-ups are made by loaded cars, the cars are coupled by impact, as both couplers are of the Tomlinson automatic type. At another location the cars must be coupled by hand, as the couplers on each type of car are of different design. Every train carries Westinghouse S. M. E. automatic air-brakes, straight air being used in regular service stops and automatic air in emergencies. Not more than two minutes to three minutes is required to back in and out for connection and to make the necessary brake and door tests before starting. Most of the time mentioned is required for charging the auxiliary reservoir on the trailer and the train line. In one case a train was made up in one minute and eighteen seconds. At Braddock Avenue the trailers are picked up on the street, but at the Highland Avenue terminal complete trains are made up in advance.

The trailers are distributed by an old motor car which has been converted into a locomotive. This car has a very low gear ratio and can shift as many as six trailers at one time.

GENERAL DESIGN OF NEW MOTOR CARS

The fifty new steel motor cars are similar to the 4000 class which was described in the ELECTRIC RAILWAY JOURNAL of Oct. 15, 1910, except for slight changes in seating at the front end, the elimination of a pocket for the front door, increases of 2 in. and 4 in. in the width of the rear exit and entrance ways respectively, and the substitution of steel posts for wooden ones. They were built by the Pressed Steel Car Company, Pittsburgh, Pa. In these cars the load transmitted from the bolsters is carried by the side frames on the principle of the Howe truss, so that the bottom framing is little more than a support for the flooring.

The chief framing members consist simply of two bolsters and the two side frames. The bottom side sill forms the tension member of a plate girder; the belt rail forms the compression member, and the side sheathing the web. The side sheathing, which replaces the usual diagonals, extends in one continuous piece along both sides of the car to the body corner posts. The window posts serve to stiffen this web vertically. The posts, side frames and letterboard are tied together. Moment diagrams were laid out for the bolsters and side frames only, since the simplest structure obtainable would be ample for carrying the floor and the equipment thereon. The side frame and underframe of the center-opening trail cars are the same as those of the motor car.



Pittsburgh Trailer Operation—Bottom Framing of Motor Car

METAL SPECIFICATIONS FOR ALL CARS

All steel castings were specified to have a tensile strength of 60,000 lb. per square inch, or an elastic limit of 30,000 lb., an elongation of 2 per cent in 2 in., and were to contain not more than 0.05 per cent phosphorus and 0.05 per cent sulphur. All other steel was specified to have a tensile strength of 60,000 lb. per square inch, an elastic limit of 30,000 lb., a minimum elongation of 18 per cent in 8 in., a minimum reduction of 35 per cent of area at the point of fracture, and was to be capable of bending 180 deg. to a diameter equal to three times the thickness of the test piece, without crack or fracture. All plate was to be of re-rolled sheet steel in order to avoid buckles.

MOTOR CAR DIMENSIONS AND FRAMING DETAILS

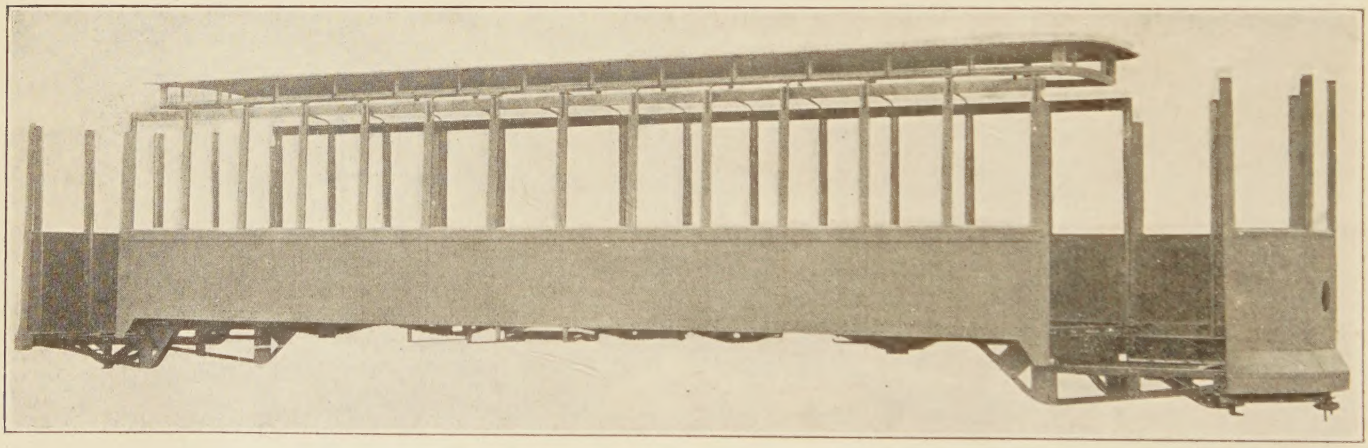
The motor cars seat fifty-six passengers each when the drop seat on the rear platform is available. The general dimensions are as follows:

Length over all outside to outside of buffer	47 ft. 2 in.
Length of car body over corner post	33 ft. 1½ in.
Length of rear vestibule to outside of buffer	7 ft. 3¼ in.
Length of rear platform inside	6 ft. 6 in.
Width of body over all at belt rail	8 ft. 2 in.
Width of body at drip rail	8 ft. ¼ in.
Width rear and front at crown piece	7 ft. 0 in.
Width of opening at rear bulkhead	3 ft. 9 in.
Height from rail to top of roof	11 ft. 6 in.
Height from rail to top of platform floor	2 ft. 8 in.
Height from platform floor to car floor	1 ft. 0 in.
Height of door opening	6 ft. 9 in.
Track gage	5 ft. 2½ in.
Diameter of wheel	34 in.
Truck centers	21 ft. 6 in.

Clearance to suit 6-ft. wheelbase.

The side sheathing, which is made of 3/32-in. open-hearth steel, is divided into sections at every third post to facilitate repairs. The plates are riveted to the flanges at each post. A 3/32-in. steel splice plate, which is wide enough to take two rows of rivets, is provided at each joint of the side sheet to permit the removal of plates without disturbing the post itself. The section modulus of the side frame is 35.6. A lesser thickness than 3/32 in. could have been used for the plate, but that dimension was adopted to insure the prevention of buckling. The belt rails are made of 4-in. x 7/16-in. rolled bars in one piece, from corner post to corner post. They are covered with a pressed-steel window sill.

The side sills are continuous from corner post to corner post. The end sills are fastened to the side sills with angles and gusset plates. The two center sills which take the draft rigging strains extend from end sill to end sill. The cross sills are made of pressed channels with continuous top and bottom plates. It may be noted that the bolsters were cored to permit the easy installation of air brakes, piping and wire conduits. The fiber stress in the bolsters was figured at 9000 lb.



Pittsburgh Trailer Operation—Side View of Motor Car Framing

The center and side bearings are easily removable. To remove the strain from the bolts the car-body center plate was provided with a lip on either side extending over the edges of the bolster.

Each of the two inside platform knees extends in one continuous piece from the bolster to the buffer channel, being fastened to the bolster and end sill by means of gusset plates and angle connection. The outside knees extend from the buffer back past the end sill and are fastened to the end sill and also to the side sills back of the end sill.

The channel-iron buffers are fastened to all platform knees with corner angles. They are covered with sloping shields to prevent people from standing upon them.

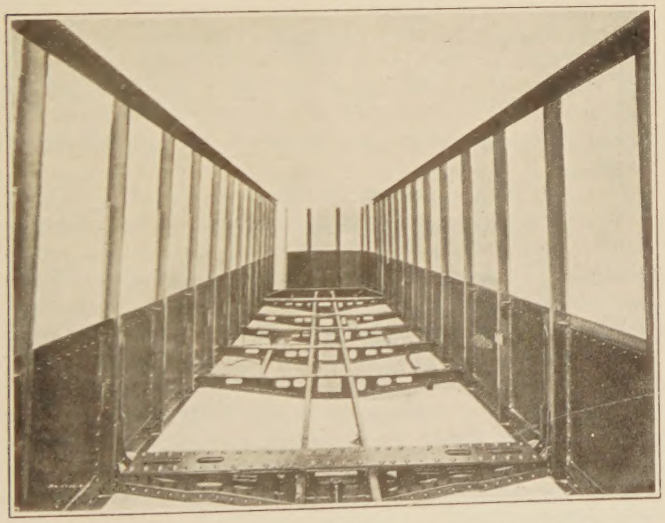
The corner and side posts are riveted to the side-sill plate and belt rail, gained into the letterboard and bolted to the letterhead and steel carlines. The distance from the center line of a corner post to that of a side post and between the center lines of the side posts is 30 in., thereby making all window sash interchangeable. The curtain and sash grooves are of extruded steel which is buck-bolted into the posts with a slotted nut.

The roof, which is of the monitor-deck pattern, has ⅜-in. x ¼-in. continuous steel carlines. White-ash carlines are bolted to these steel carlines. Two other wooden rafters are placed between each two steel carlines. The roof sheathing is of poplar. A Perry ventilator is installed at each corner of the monitor, which is glazed with wired glass. The car and platform floors, top side rail, deck rails, transom posts, doors, sashes and hood carlines are of wood. The interior of the car is of cherry, and the ceilings are of bird's-eye maple.

PASSAGEWAYS AND DOORS

These motor cars are of the Jones prepayment type, in which the conductor's platform is inclosed by two-leaf, hand-operated entrance and exit doors and the motorman's platform by an air-operated, sliding exit door. Fixed platform steps are provided at the front and rear end. These steps are completely inclosed when the car is running. The height from the ground to the first rear step is 17½ in., to the platform 14½ in. and from the platform to the car floor 12 in. The front or exit step is 17½ in. above the ground.

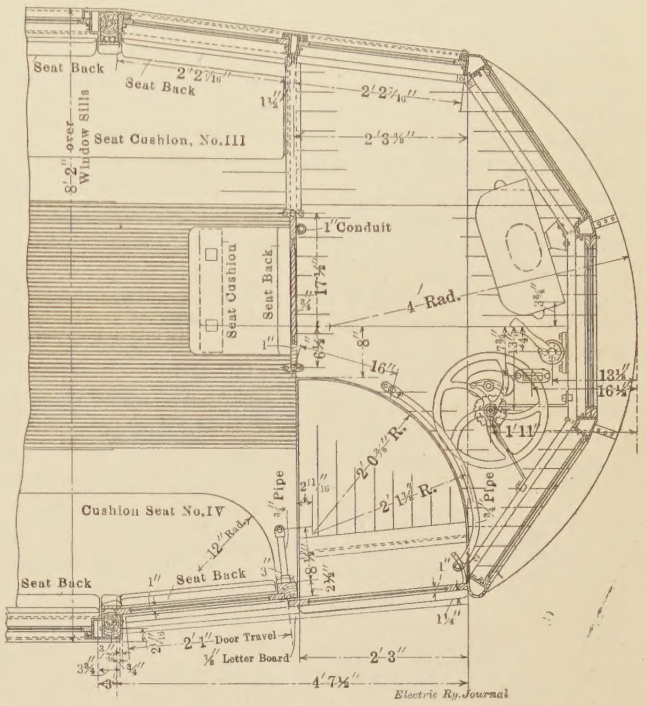
The conductor's platform has the usual railing, which is placed so as to give an entrance 27¾ in. wide and an exit 26½ in. wide. A vertical stanchion has been installed so that when a passenger leaves by the front exit he can brace himself first against the stanchion on his left and then against a right-hand rail before he enters the vestibule. The floor of the front vestibule is level with the car floor except for a pocket of quadrant form which is 12 in. below the car floor and located as shown in the accompanying plan. The curved pipe railing along the upper and inner



Pittsburgh Trailer Operation—Framing of Motor Car Before Addition of Roof Members

edge of this pocket serves the double purpose of separating the motorman from the stream of travel and of aiding the passengers to alight.

Both the rear and front doors possess several interesting features. The bottom of every door is cut in for a rubber cushion so that clothing can be removed without injury if caught in a closing door. All doors have 18-in. grab-handles which are set diagonally at a height which affords most efficient aid to passengers without actually encroaching upon the clearance limits; for instance, as in entering, when the passenger's arms naturally glide over the handles on the two panels. Neither the steps nor the grab handles are accessible from outside when the car is in operation. Rubber bumper pieces are provided to prevent the folding doors



Pittsburgh Trailer Operation—Plan of Motorman's Platform and Front Exits

from being marred if drawn together too fast. The sliding exit door is protected against violent impact by a rubber strip on the doorpost.

The rear doors are arranged for separate or simultaneous operation. Their movements are controlled by the conductor through the medium of two small handles placed

Pittsburgh Trailer Operation—Cross and Longitudinal Seating of Motor Car

one above the other in the vertical post of the platform railing. The upper handle is used to control the entrance and the lower handle to control the exit doors. The operating mechanism comprises a simple arrangement of sprocket wheels, chains and bell cranks and levers, the leverage system being so proportioned that a pull of only 8 lb. will exert a pressure of 2½ lb. at the doors and close or open the same in about three-tenths of a second. Should

a person jump on the car as the entrance door is closing, the panels would fold in behind him and push him onto the platform. It is very difficult to force the panels apart as long as the conductor holds the handle in place. The doors are self-locking in the open and closed positions.

When cars with this mechanism were first placed in service the conductors were notified to close the doors first and then to ring the starting bell. It was found in practice, however, that the conductor could ring the bell first and then close the doors before the motorman had really interpreted and obeyed the starting signal.

The sliding exit door is provided with a pneumatic mechanism made by the Consolidated Car Heating Company in accordance with the design of the Pittsburgh Railways. The door is opened by air pressure and closed by the tension of a helical spring which opposes the pressure of the pneumatic cylinder. A collapsible piston is provided to close a port and so check the movement of the door.

GENERAL OPERATING EQUIPMENT

The motor cars are mounted on two Standard C-50 motor trucks which weigh 7000 lb. each. These trucks carry four inside-hung 50-hp Westinghouse 306-C.D. interpole motors. The control system, with the exception of one train, which uses Westinghouse type HL equipment, consists of the General Electric Company's K-43-C controllers with auxiliary contactor, control switches and an M-503 line switch for the main power circuit. The fuse boxes and lightning arresters are of Westinghouse manufacture and the trolley stands of the R. D. Nuttall Company's U. S. No. 14 type with ball-bearing base. The Consolidated electric heaters are furnished with thermostatic regulators. The lighting system comprises twenty-five 16-cp lamps, eighteen of which are inside the car.

The air-brake equipment is of the Westinghouse S.M.E. type for semi-automatic operation. The operating valves have a time limit of nine seconds before a release from emergency, in order to deter motormen from making needless emergency applications. Another feature of the air-brake system is that in addition to the intake line on the roof there is provided another which has an auxiliary strainer made of four layers of hair felt separated by brass screens of No. 30 mesh. This strainer traps all sand, carbon dust and excessive moisture which would otherwise get to the bearings of the compressor. This equipment is placed in a 21⅝-in. x 8-in. x 8-in. air-tight wooden box made of ⅞-in. stock and installed under one of the seats. The cost of a complete strainer was about $2.25.

The Peacock brake equipment at the front end of the car comprises an 18-in. hand wheel with a staff carrying 12:48 compound gearing. The rear platform of the car has a similar brake but with a drop-type handle which is attached to the dividing rail.

All wiring is carried in steel conduit with standard junction boxes and condulets. The switches and fuses of the air-brake, lighting and heating circuits are placed on a slate switchboard in an asbestos-lined cherry cabinet in the motorman's vestibule. All of the lights are on one switch, but each light circuit is fused separately. The heater switches are also installed on this board, but only one of them is required when the thermostatic regulator is in service.

During the day the passengers have a clear view through the motorman's vestibule, but at night the usual curtain is drawn down from the hood. A mirror is installed to enable the motorman to watch the passengers as they leave the car.

The miscellaneous equipment of these cars includes Tomlinson radial couplers for trailer operation, Wilson trolley catchers, two gongs besides the two electric vibrating bells of the push-button system, one headlight, Hunter illuminated vestibule signs, enameled iron destination sign, signal lights over the window of the motorman's cab and a 10-ton double-acting Barrett jack placed on the motorman's platform for emergencies.

The layout of the equipment of these cars was carefully planned with the object of equalizing the weight distribution as much as possible. For example, as the compressor weighs about 900 lb. it is carried under the longitudinal seat side to balance the greater passenger weight on the transverse seat side. In like manner the electrical equipment of the motorman's cab counterbalances the greater length of the rear platform.

CENTER-OPENING, SEMI-CONVERTIBLE TRAIL CARS

The main dimensions of the center-opening pay-at-entrance trail cars built by the Standard Steel Car Company are as follows:

Length of buffers	45 ft. 0 in.
Length over dashers	44 ft. 0 in.
Width at belt rail	8 ft. 2 in.
Width at eaves	8 ft. ¼ in.
Width over side sills	7 ft. 11 in.
Height from rail to top of roof	10 ft. 6 in.
Height from rail to top of floor at center	2 ft. 6 in.
Height from rail to bottom of side sill at door opening	12 in.
Height from rail to bottom of side sill at bolster	2 ft. 0 in.
Height from bottom of side sill at bolster to top of roof	8 ft. 6 in.
Center to center of bolsters	21 ft. 8 in.
Height from rail to top of side sill at center opening	13 in.
Truck wheelbase	4 ft. 4 in.
Diameter of wheels	22 in.
Gage of track	5 ft. 2½ in.

The car body is of semi-steel construction. The underframe, side framing and posts are of steel and the roof framing, doors, sash and seat framing are of wood. No end doors are provided. The seats extend continuously around the car except at the center doors, where swing seats are arranged for use when the opposite door opening is in service. The total seating capacity is sixty-two.

FRAMING DETAILS OF TRAILERS

The sides of the trailer cars below the windows are built up of steel plates and shapes in the form of a plate girder except at the center door, where suitable truss members are provided, the side sills being dropped for suitable step heights. A header consisting of a 6-in., 8-lb. rolled-steel channel extends across the doorway between the side posts, which are located in the backs of the door pockets. The side sheathing below the windows consists of 3/32-in. steel plates. In general the window framing in the trailers is like that of the motor cars except that the curtain and sash grooves are of extruded aluminum instead of steel. An anti-telescoping plate of ⅛-in. open-hearth steel plate is fastened to the buffers and draft sills at each end of the car and bumper guards of 3/32-in. rolled steel are installed as on the motor cars. One variation from the motor car is the absence of headlining in the upper deck, the carlines and underside of the roofing being visible. The lower deck has a three-ply veneer headlining to support advertising cards.

CENTER-DOOR MECHANISM OF TRAILERS

The sliding doors at the center opening of the trailers are double, each section being arranged to slide into a suitable pocket. The doors are operated by air and closed by the tension of a spring. The door valves are located conveniently for the conductor, who stands at the center of the car alongside the fare box. Hollow rubber buffers are fastened to the front edge of the doors, while at the top and bottom solid rubber blocks are fastened to the door stiles inside of the hollow buffers, the whole being designed to provide against injury to passengers if accidentally caught between the doors and the center post when they are closed.

TRUCKS AND MISCELLANEOUS EQUIPMENT OF TRAILERS

As previously noted, one of the most interesting features of these trailers is the use of two trucks with 22-in. diameter wheels, requiring but two steps to the car floor instead of three. These trucks weigh only 3800 lb. each and so far have required no attention whatever other than the usual brake adjustments.

All trailers have a complete hand-brake mechanism with a drop brake handle of the Pittsburgh type, located at the conductor's position, and a 12:48-geared Peacock brake at the bottom. This brake, of course, is arranged to operate

in connection with the air-brake rigging. Each trailer is heated with a No. 2-T hot-air blower heater of the Peter Smith Heater Company. The other equipment includes four destination signs, couplers, gong and emergency whistle.

STANDARD PAINTING SPECIFICATIONS FOR STEEL CARS

All steel cars were painted according to the Flood & Conklin system in line with the following specifications:

"The 'inspector of painting' for steel cars will give his careful attention from the starting point in the erection shop (where careful men are placed) to see all pieces assembled and inaccessible parts carefully painted.

"Paint fittings with primer No. 1 dark.

"See that the side sheets, all joints under the belt rails, corner posts, pockets, decks and all pieces of steel which are riveted together are carefully painted on both sides where they come together. This will make a good, tight joint. The riveting may then be started.

"When the car is ready to go to the sandhouse clean all greases, red lead or fittings paint off of all parts on which it is exposed. The car should then go through a sand-blast process. If the weather is frosty, let the car get warm before sanding, as it may be full of frost, because the steel from the time it leaves the steel yard and erection shop to the time it gets to the sandhouse has had no chance to get the frost out of it.

"After sand-blasting the car, blow all sand off frames, place the car in the paint shop immediately and apply a coat of priming to it, both outside and inside. It is most important that this coat of primer No. 1 dark be applied immediately after sand-blasting and cleaning, before there is any chance for an accumulation of moisture, dirt or grease on the surface.

"Prime the underframe and the inside framing, before laying the floor, with primer No. 1 dark.

"Inspector should look the car over carefully to see that all loose rivets are cut out. Before bolting or riveting on small fittings have same primed so as not to delay operations. The car is now ready for primer.

First day—Prime car with primer No. 1 dark.
Second day—Putty and glaze where necessary.
Third day—Give coat of surfacer No. 2.
Fourth day—Putty and knife with No. 3. (Use for putty No. 3 with dry white lead for knifing No. 3 straight.)
Fifth day—Give car coat of No. 3.
Sixth day—Give car second coat of No. 3.
Seventh day—Give car third coat of No. 3.
Eighth day—Give car fourth coat of No. 3.
Ninth day—Knife car with surfacing composition in opposite direction to last coat of No. 3.
Tenth day—Put guide coat on. Car is ready for rubbing.

"For rubbing use Eureka rubbing stone and water; let stand one day. Then sandpaper with No. 00 sandpaper.

"Give two coats of Pittsburgh Railways Company standard Tuscan red. Stripe and letter as per sample.

"Give car three coats hard-drying body varnish, forty-eight hours between each coat.

"*Roof.*—Underside of canvas to be coated with elastic roof composition and the deck surfaces on which it is drawn to be slushed with the same material. Three coats of elastic roof composition to be applied to the canvas, allowing forty-eight hours between coats.

"*Ironwork.*—One coat of primer No. 1 dark, reduced with turpentine, to be applied on all ironwork. Allow forty-eight hours for drying and apply one coat of Peter's black.

"*Floors.*—Apply two coats of floor composition, allowing twenty-four hours between coats.

"All interior finish must be stained as per sample. After being stained, same should be given a coat of shellac; then give three coats of varnish, two coats of rubbing and one coat of inside finishing varnish.

"All paints and varnishes are to be applied in a workmanlike manner as per the following instructions:

"First—One coat of stain mixed with raw linseed oil.

"Second—One coat of shellac.

"Third—One coat of rubbing varnish. Allow twenty-four hours for drying.

"Fourth—Second coat of interior finishing varnish; all interior finish to have a bright gloss, with no rubbing required."

MID-WINTER CONVENTION

Formal notice has been issued that the morning session of the mid-year conference of the American Electric Railway Association will be held at 10:30 and the afternoon convention will begin at 2:30 on Friday, Jan. 26. The meetings will be held on the fifth floor of the United Engineering Societies Building, 29 West Thirty-ninth Street, New York.

Among those who will address the conference will be Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company; Patrick Calhoun, president of the United Railroads of San Francisco, and James H. McGraw, president of the McGraw Publishing Company. Luncheon will be served at the Engineers' Club at 1 p. m., and the banquet will be held at the Hotel Astor at 7 p. m.

ALLEN & PECK PURCHASE A VIRGINIA COMPANY

Announcement was made Jan. 14 that the firm of Allen & Peck, Inc., which has recently been organized under the laws of New York State to build, finance and operate public utility properties, had secured control of the railway, gas, electric light and ice companies in the territory of Newport News, Hampton, Phoebus and Old Point Comfort, Va. At a meeting of the Newport News & Old Point Railway & Electric Company held in Newport News on Jan. 12, just subsequent to the purchase, C. Loomis Allen, of Syracuse, was elected president and E. F. Peck, of Schenectady, was elected vice-president of the company. Others who were interested with these gentlemen in the purchase of the properties were B. Howell Griswold and John Opper, of Baltimore, and Charles D. Dickey and James May Duane, of New York. The companies taken over were the Newport News & Old Point Railway & Electric Company, the Citizens' Railway, Light & Power Company, the Hampton Roads Traction Company, the Newport News Gas Company and the Distilled Ice Company of Virginia. The gross earnings of these companies for the year ended Oct. 31, 1911, were approximately $650,000.

The firm of Allen & Peck, Inc., which will administer the affairs of these companies, was organized a few weeks ago with Mr. Peck, general manager Schenectady Railways Company, as president and with Mr. Allen, vice-president and general manager Syracuse Rapid Transit Company and Utica & Mohawk Valley Railway, as secretary and treasurer. These gentlemen, with Henry B. Boardman, vice-president Schenectady Trust Company, and John Rapelje, of Hopewell, N. Y., are the directors of Allen & Peck, Inc. The headquarters of the new firm for the present will be at Syracuse and Schenectady, but probably they will be moved later to New York.

The organization of the new firm has made no change in the railway connections of Messrs. Allen and Peck, who are still officers of the properties in central New York mentioned above. But they expect to give considerable attention to their new undertaking and later may find it necessary to devote all of their time to its affairs. The firm of Allen & Peck will begin its career with strong financial backing and with officers whose experience in the engineering, financing and operation of public utilities is unexcelled. Their standing is the highest guarantee that nothing will be lacking as regards expert knowledge, and with the banking connections which it has established in New York and elsewhere the firm should have a prosperous career, of which the purchase of the Virginia enterprise is just the beginning.

Papers at the Dayton Convention

The Subjects Discussed Included the Responsibility of Railway Officials, Hospital Service, Timber Preservation, Reports of Committees, etc.

DUTY, OBEDIENCE, RESPONSIBILITY

BY ALEXANDER SHANE, GENERAL MANAGER INDIANAPOLIS, COLUMBUS & SOUTHERN TRACTION COMPANY

My subject has been worn threadbare time and again; but if, by calling your attention to a few facts, I can succeed in stimulating any of my hearers to renewed effort, I shall have accomplished all I could hope for. It may perhaps be, as Elbert Hubbard said, in writing a description of Polk's model milk plant at Indianapolis: "I never knew that I knew so much about milk as when that mild-voiced dairymaid told me the things I know and which I didn't know until she told me."

I am afraid I cannot enlighten any of my hearers on the subject of interurban railroads; but, to enable you to draw some conclusions, I will call your attention to a few facts and give some data. In so doing I will confine myself to Indiana, as that is the territory with which I am most familiar. The first steam railroad in Indiana was built about 1847. In 1911, sixty-four years later, there were 7000 miles of railroad, employing 250,000 persons. Of this number, there are 50,000 who are sufficiently informed and in a position to co-operate in improving the service.

The first electric line built in Indiana was put into operation on June 1, 1898. At this time, thirteen years later, there are more than 3000 miles of road, employing 237 officials and 6000 other employees, all of whom are in a position to render more or less assistance in protecting the public and the company's interest by assisting in guarding against accidents and looking after the comfort and convenience of the patrons of the roads.

The Railroad Commission of Indiana was organized on May 1, 1905, but was not authorized to inquire into the affairs of the railroads, in regard to safe operation, until 1907. On June 1 of that year there were appointed three inspectors, whose duty it was to make inspection of the various lines of the State, consisting of more than 10,000 miles of road. During the remainder of 1907 the work of the inspectors was confined principally to the steam roads. The attention of the commission, however, was called to eighty-three cases on the electric lines. During the year 1908 there were 852 cases on electric roads reported to the commission; during 1909, 248 cases; in 1910, 118 cases, and in 1911, 117 cases. This showing is excellent for the interurban lines. It demonstrates the fact that they have been progressive, that they realize the demands of the public and fully appreciate that they are public servants. They have risen to the occasion and so improved the service by correcting defects, adopting better systems, being more observant of rules and in every respect more thorough and efficient, that in 1911 the number of cases reported by the State inspectors has been reduced 86 per cent as compared with the year 1908.

The 117 cases reported in 1911 were on twenty roads and referred to such matters as failure to stop at railroad crossings, not making crossing stops, failure to comply with rules, markers not properly displayed, talking to motormen, crews displaying signals without order, conductor signing orders without repeating, defective brakes, backing up without flagging, switch unlocked, motormen handling baggage, dispatcher handling interlock, crowded cars, conductors physically disqualified, dirty waiting rooms, closets and stations in unsanitary condition, not having separate toilet rooms and telephone trouble. The cases referred also to all such matters as relate to safety, convenience and comfort—things that every employee on interurban roads is perfectly familiar with, so as to know when they are in any way a menace or at all objectionable. However, the above-mentioned cases were of a very different character and not so important as those reported in 1908.

Inspectors of the Railroad Commission are governed by a sense of duty as public servants. They are dependent upon their personal characteristics and appreciation of their obligation and upon their desire to hold their positions. Every employee of interurban lines, whether an official or a subordinate, owes the same duty to the State as a citizen—owes it to the public, to his employer, to his family and to himself. His future success depends on the reputation he establishes for the thoroughness of his work. He must be obedient to his superiors and to all just and lawful authority. And more: Officials and employees are responsible. We must answer to our superiors for every overt act, and to the public, through the law, for every act of criminal carelessness. As to the law, I do not lay much stress upon it, because such acts are rare, and each year and month fewer mistakes occur. The standard of employees is constantly and rapidly being raised. These changes are quite noticeable to me, and I have made it my business to watch and study them.

As the steam roads were built and developed by men who grew up in the service, so has it been with electric railway men, and when we consider the steam roads in the State to-day, after sixty-four years, compared with the interurban roads with only eleven years of development, the difference is phenomenal. I do not believe this condition is brought about through fear of any lawful or superior authority as much as from a desire on the part of the men to develop themselves and their systems. I do not believe that men become lastingly better men and better servants through fear or coercion. They must be prompted by a heartfelt desire, and that this is true of interurban men is evidenced by their earnest desire to acquire knowledge. It is for this reason that we are here assembled—that we may exchange ideas, discuss questions of importance, become better informed, and make still greater progress by rendering still better service to our patrons and being more deserving of their patronage.

If we are to get the greatest possible benefit from these meetings they should not be junketing expeditions. Ample time should be given to discussions, that the greatest good may be obtained, even though it be necessary to prolong the meetings and make them less frequent. If these conventions are to be beneficial to member companies, as many employees as possible should attend, because information obtained here cannot be disseminated among fellow workmen with as good results as if they themselves had attended in person, and if it is desired that as many as possible attend, then the association in this respect should have the support of the local companies. And the more proficient we become the less room there will be for criticism. We can then welcome a representative of the State and consider him as an ally rather than a censor, and we can be fully prepared to fulfil every duty and be responsible for our acts.

Then if the inspector comes to us in and is received by us with this spirit, better results will be obtained, for when this vast army is engaged as one man in correcting errors and improving the service, how much more will be accomplished.

No men are more interested or in a better position to reduce accidents to the minimum than the railroad men, and if done at all this work must be done by them. It is their duty, and the responsibility rests upon them.

THE ILLINOIS TRACTION SYSTEM HOSPITAL ASSOCIATION

BY H. M. BASCOM, CHIEF SURGEON ILLINOIS TRACTION SYSTEM

The general plan of the Illinois Traction System Hospital Association is similar to that on many of the steam railways except that we do not have hospitals of our own. Instead, we have a contract arrangement with twenty-seven public hospitals already in existence. Thus we reduce the distance which a sick or injured person has to be transported. Here is one instance where a short haul is preferable to a long haul. The Illinois Traction System Hospital Association was organized in 1907 for the benefit of the employees of that company. Originally membership in it was optional with employees, but now it is compulsory. The benefits to the employee are:

(1) Medical attention in case of accident or sickness.

(2) Hospital care when it is necessary for the employee to go to the hospital. This necessity is determined by the local surgeon, but no operation is performed, except in emergency cases, without the consent of the chief surgeon.

(3) Medical care at reduced rates for the family of the employee. The charge for family medical attendance averages one-third less than the ordinary fees and depends somewhat on the locality in which the patient resides.

(4) The payment by the association of $50 for funeral expenses in case of death of an employee.

The dues vary according to the wages received by the employees and range from 25 cents to $1.75 per month. Experience has shown that a uniform charge of 1 per cent of the wages would be more desirable. The payments to the fund are made by deducting the amount of the dues from the wages of the employees. These payments fall short of paying the charges of the hospital association by from $300 to $400 a month. The difference is made up by the company.

The affairs of the association are administered by a board of trustees which holds quarterly meetings. The board is made up of one representative from each of the operating companies composing the Illinois Traction System, one representative from the Decatur shops, the general manager of the Illinois Traction System, who is ex officio chairman of the board; the treasurer of the Illinois Traction System, one representative from each of the operating companies composing the Western Railways & Light Company, and one member who represents the operating superintendents of the Illinois Traction System and of the Western Railways & Light Company and the employees in the general offices of those companies. The general manager of the Illinois Traction System appoints the medical and surgical staff and makes the contracts with the hospitals and for the supplies, etc.

All applicants for employment on the railway system above the position of track laborers must pass a physical examination. A report of this examination is sent to the superintendent and another to the chief surgeon. If the examination is not considered satisfactory by the chief surgeon, the superintendent is promptly notified. This examination insures for the company employees who are physically up to the standard and can do a day's work in a day, and for the hospital association no chronic invalids.

Contracts are made by the company and the hospital association with surgeons in the towns and cities along the road. The association has contracts of this kind with 103 physicians. Bills arising from this work come to the chief surgeon's office for approval with bills for drugs, hospital supplies, etc. The local surgeons are provided by the chief surgeon with injury report blanks. When any person is injured the local surgeon fills out a blank and sends one copy to the claim department and another copy to the chief surgeon. In important accident cases the train crew is instructed to notify the dispatcher by telephone, and the dispatcher immediately reports the facts to the general manager, general superintendent, claim department and chief surgeon.

In cases of emergencies, when the hospital association physician cannot be found, an outside physician is called in, but the case is then transferred to the nearest hospital association physician. The association also has a staff of consulting surgeons of prominence in the medical profession residing in Danville, Springfield, Peoria and St. Louis.

INSURANCE

The plan of establishing a system of life insurance for employees was originated by Mr. Chubbuck, vice-president executive. It was first proposed to the men in 1908, but was carried by so small a majority that it was not then put in force. The following year it was generally indorsed by the men and went into operation. Under this plan the men contribute to an insurance fund, and the company guarantees the prompt payment of $800 upon the death of any member of the association. If the fund is sufficient to pay the full $800, the company adds $200, making the payment $1,000. The plan was to pay but one death claim a month, but deaths have occurred more rapidly than this rate, and during the past eighteen months twenty-one claims of $800 each have been paid. The time is approaching, however, when the amount to be paid will be $1,000, after the company has been reimbursed for money advanced on the death claims already paid.

The amount of good which this plan has been to the families of the men is inestimable. We believe that when they know that their interests are safeguarded in this way they realize that there is a unity of interest which inures to the good of all concerned.

REPORT OF SECRETARY-TREASURER OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

BY A. L. NEEREAMER

Our interurban railway membership now consists of fifty-four lines with a total of 3672 miles, and, in addition, we have one city line. During the past year we have lost one line of 37 miles. This leaves a net increase of eight lines and 192 miles. During the year 1911 we had 139 members in the supply men's department, an increase of eleven over the year 1910.

Receipts and disbursements for the year just past are as follows:

RECEIPTS AND DISBURSEMENTS.

Receipts:		
Cash on hand, Jan. 1, 1911	$801.28	
Received from interurban lines	3,516.76	
Received from city lines	37.50	
Received from supply men	1,112.00	
Sale of buttons	28.00	
Stationery and printing	1,730.10	
Central Electric Accounting Conference	134.98	
Interest	26.15	
		$7,386.77
Disbursements:		
Payroll	$3,182.48	
Traveling expense	181.55	
Stationery and printing	1,856.80	
Postage	204.18	
Telephone and telegraph	89.95	
Office incidentals	23.15	
Taxes and insurance	8.80	
Freight and express	45.82	
Office fixtures	55.00	
Rent	504.00	
Legal expense	10.75	
Central Electric Railway Accountants' Association	22.00	
Cash on deposit	387.09	
Invested at 4 per cent	815.20	
Total		$7,386.77

The above figures are somewhat of an increase over the year preceding. This is due to the reissue of joint passenger tariff No. 6, which was paid for out of the treasury and collected from the participating carriers on the basis of the number of copies ordered. These figures will also show that the association is still prospering. After the

close of business in the year 1910 our cash on deposit amounted to $801.28, while at the close of business Dec. 31, 1911, we have on deposit $1,202.29; $815.20 of this amount is deposited in a trust company drawing 4 per cent interest.

Your attention is also called to the following statement of assets and liabilities:

ASSETS AND LIABILITIES.

Assets:		
Cash on deposit	$1,202.29	
Due from railroads	89.80	
		$1,292.09
Liabilities		000.00
Balance		$1,292.09

Your secretary-treasurer is proud to refer to the above statement, and at the same time desires to call your attention to the fact that all of the bills for the year 1911 have been paid and that our assets are about 50 per cent greater than they were a year ago.

The territory embraced by this association contains somewhat more than 10,000 miles of interurban railway, out of which we have about 36 per cent in this association, leaving a great field to be worked upon for membership. Your secretary has used every endeavor to secure new member lines during the past year and has several good prospects in view for the coming year in that line.

The work and reports of the standardization committee during the past year have been published and distributed among the member lines and manufacturing firms.

This report would not be complete if some reference was not made to the claim index bureau. This bureau was organized in the latter part of the year 1908 and has been struggling along since that time. The good work that this bureau can do for the members apparently has not been fully realized, or greater interest would have been taken in it. Several roads are reporting to this bureau regularly and others occasionally, but some roads have not filed a report. It is to be hoped that the absence of reports denotes an absence of trouble. If this bureau is to be continued it should have the hearty support of each member and reports should be made regularly.

In conclusion, I desire to express to the officers and members of this association my sincere thanks for their assistance and co-operation during the year which has just passed.

REPORT OF CHAIRMAN OF THE TRAFFIC ASSOCIATION

BY A. L. NEEREAMER

Your chairman begs leave to submit his report for the year ended Dec. 31, 1911.

Before entering upon the details of this report I desire to state that congratulations are due the members for the amount of work accomplished and the expeditious manner in which it was transacted during the past year.

The Central Electric Railway Association has a membership of fifty-four interurban lines, aggregating 3672 miles. Of this number forty-three lines, with a mileage of 3114, are members of the Traffic Association and participate in its various publications, rules and regulations. This is an increase of seven lines and 152 miles over the year 1910.

Thirty-six lines, representing 2837 miles, are participating carriers in joint passenger tariff No. 6. As two of the lines that participated in tariff No. 3 have withdrawn, this makes a net increase of seven lines in this publication.

The Central Electric Traffic Association interchangeable 1000-mile ticket is now participated in by thirty-four lines, with a total of 2591 miles. During the past year one line has withdrawn from this publication, which leaves us with a net increase of six lines, totaling 237 miles.

The joint and local baggage tariff is participated in by thirty-eight member lines, having a total of 2930 miles.

The chairman files the official classification for thirty-two member lines, having a total of 2240 miles.

The first seven months of this year were occupied in revising and reissuing joint passenger tariff No. 3, the new issue bearing the title of joint passenger tariff No. 6. During that same period the joint and local baggage tariff and interchangeable 1000-mile ticket tariff were reissued twice in order to incorporate new properties and various changes in the conditions. Following the publication of joint passenger tariff No. 6 the time was occupied with the work of computing the divisions of the interline rates quoted in that tariff.

During the past year there have been eleven supplements issued to the official classification. Of these eleven six have been issued on less than statutory notice by permission granted your chairman by the Interstate Commerce Commission. This work alone has saved considerable time and expense to the participating lines, as the application was made and the filing was done by the chairman.

The Central Electric Traffic Association mileage ticket is becoming more popular every day. In the three years and four months that this ticket has been in operation over 15,000 tickets have been ordered through this office and placed in the hands of the agents for the use of the public. This is an average of about 5000 a year, or just about two tickets for each mile of road participating.

In February, 1911, arrangements were completed with the Central States Guide Company for the correct publication of train schedules for member lines in lieu of the publication of a guide by the association, the contracts being made between the individual members and the Guide company upon the basis arranged for by our special committee. This has proved to be an advance in the right direction and of great value to the properties which have been represented.

After two years of hard work the committee on official interurban map has completed its work, and we expect in the near future to have in the hands of the member lines a map for distribution to the public which we think will cover a long-felt want and will be the means of securing considerable traffic, both freight and passenger.

During the past year your chairman has had considerable correspondence with several lines that are members of the parent association, endeavoring to persuade them to participate in the work of this body, and the prospect is very good that one or two of the larger lines will participate in this work during the coming year. There are in our territory several of the smaller lines that are not members of the Central Electric Railway Association which have signified their intention of becoming members in order to participate in the reissue of joint passenger tariff No. 6 at any time that this publication is reissued.

We now have in the hands of committees several important projects upon which we expect to have definite reports within a very short time. Among these projects are the publication of a joint exception sheet and the possible formation of a joint weight and inspection bureau.

I desire to call your attention to the fact that the mileage represented in this association, in three States only, is more than double the mileage of the entire New England States. In addition to this, your association still holds the unique position of being the only traffic association among interurban lines in this country.

In conclusion, the chairman desires to express his sincere thanks and heartfelt appreciation of the conscientious co-operation and support given him during the past year by the committees and members not only of this body but of the parent association. Peace and harmony have existed in our ranks during the past year and everything tends toward unity in the work of the future. The prospects for the coming year, so far as this association is concerned, are brighter than they ever have been.

ANNUAL ADDRESS OF THE PRESIDENT OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

BY E. B. PECK, INDIANAPOLIS

The Central Electric Railway Association is the most virile and effective association of electric railway officials in the world. Its field is confined almost exclusively to electric railroads. Its membership consists almost entirely of electric railway companies termed "interurban," and includes but one street railway company and no urban property. Its work and efforts have been entirely applied to the betterment of the conditions governing the operation of electric railroads as well as the betterment of conditions pertaining to the traveling public. Many serious and perplexing problems have come before the association after having been thoroughly and carefully considered by the individual members of the committee to which the subject was assigned. When recommendations and reports have been made by the committees the confidence of the members of this association in the committees has been such that in almost every instance the recommendations have been adopted. The operation of the electric roads is a matter in which the public is a partner. Every action taken by this association, every adoption of an improvement in operating conditions, has recognized this fact. That the association has attained the position mentioned in the opening sentence is due to the hard work and the interest taken by its members, and particularly by the members of its committees.

WORK OF TRAFFIC ASSOCIATION

No small part of this work and zeal has been participated in by the Central Electric Traffic Association. The Traffic Association is perhaps the most valuable adjunct of the Central Electric Railway Association. The extension of the sphere of usefulness to the electric railroads has taken place through the Traffic Association more than by any other means within the Central Electric Railway Association. The conclusions upon joint tariffs, applying to both passenger and freight, the many perplexing problems that have been solved in the meetings of the Traffic Association and the results obtained from these meetings have made possible the issuance of a joint tariff representing thirty-six companies, members of the Central Electric Railway Association, and covering 2837 miles of road. All companies that are members of the Central Electric Railway Association are not members of the Traffic Association, although their membership in the Railway Association entitles them to this membership. It is hoped that the coming year will see a larger membership in the Traffic Association, as the benefits to members, when fully understood, will convince any member company of the Railway Association that it is an advantage to participate in the Traffic Association.

On Oct. 14, 1909, the Traffic Association issued its first joint passenger tariff, which covered rates between all stations in the territory of the members of the Traffic Association. On Aug. 19, 1911, the joint passenger tariff was reissued and 1000 copies were distributed among the members for use. This last tariff contained 250 pages, covering thirty-two head-line points. Under each head-line point the single and round-trip rates are shown for an average of 397 stations, thus enabling any agent at any station upon the road of any member company to sell a ticket to any other station upon any other road that is a member of the Traffic Association. The chairman of the Traffic Association is the agent of each member company, and through him the tariff is filed with the Interstate Commerce Commission and with the various railroad commissions that govern.

GROWTH IN MEMBERSHIP

The organization of the Central Electric Railway Association was perfected in 1906 by the consolidation of the Ohio Interurban Railway Association and the Indiana Electric Railway Association with a membership of thirty roads and 2141 miles. At the present time the membership consists of fifty-four companies and 3672 miles of interurban roads. The membership in this association represents more than twice the mileage of all interurban roads in the entire New England States. The New England mileage, according to the *American Street Railway Investments* for the year 1910, was as follows: Connecticut, 242; Maine, 371; Massachusetts, 611; New Hampshire, 89; Rhode Island, 121; Vermont, 59; total, 1493 miles. The interurban mileage within the territory covered by the Central Electric Railway Association more than equals the distance from Boston to San Francisco and return.

Notwithstanding the fact that our membership represents mileage within the States of Ohio, Indiana, Michigan, Illinois, Kentucky and West Virginia, more than double the entire mileage within the New England States, we are yet far short of the mileage in our territory that should be represented in this association. We have memberships from each of the Central States mentioned, and still there are many companies in these states that should join but are not yet members. This is due very largely to the fact that railway connections have not been made so far between the lines of members of the association and those that are not members. These will, undoubtedly, when made, bring into membership those companies which are not now enjoying the benefits and privileges of the association. It may not be amiss, however, to state that our present membership comprises over 50 per cent of the total interurban mileage within the States of Ohio, Indiana and Michigan. Within the fiscal year just past the membership has been increased by eight interurban companies, representing practically 200 miles of interurban road.

If the work that has been done in the past and the many hours of hard labor that have been devoted to the interests of the association have inspired any member to feel that he has received the full benefits of the association, then that member should constitute himself a committee of one to convince his neighbor who is not a member that it will be to the benefit of his company to join the association, and it certainly should be no trouble so to convince him.

APPROVAL OF THE ASSOCIATION

That the position attained and now occupied by the Central Electric Railway Association is recognized in electric railway circles is best evidenced by the publication of such items as an article by James Anderson, president of the Canadian Street Railway Association, in the ELECTRIC RAILWAY JOURNAL of Jan. 6, 1912, in which he said: "It has been my pleasure and privilege to attend several meetings of the Central Electric Railway Association, and I believe that this association has done more to bring about uniformity and standardization of electric railways in Ohio, Indiana and adjoining states than any other influence that exists."

Another article in the ELECTRIC RAILWAY JOURNAL of the same date, the title of which is "Interurban Advancement in the North Central States," gives a brief review of the progress made in the Central States along the lines mentioned. The opening paragraph is as follows: "The Central Electric Railway Association and its affiliated bodies * * * have seriously attacked the known weaknesses of interurban operation and the more promising lines for development. During 1911 the work was fruitful and resulted in close personal and operating harmony between connected lines, improved mechanical and operating standards and increased efficiency in the traffic and accounting departments. As a consequence substantial betterments in service to the riding public followed."

These statements may be taken as the highest compliment that could be given to the Central Electric Railway Association.

RELATIONS WITH OTHER ASSOCIATIONS

The relations between our association and other electric railway associations, particularly with the American Electric Railway Association, during the year have been most cordial and congenial. We have been honored at each of our meetings by the presence of the president and upon several occasions by the presence of other officials of the American Association.

During 1911 the scope of usefulness of the association has been extended by the merger of the Central Electric Accounting Conference. This action will without doubt add to the many benefits accruing to the member companies, as it will bring the accounting department into closer relationship with all other operating departments of the membership. Many questions come up in the Traffic Association which bear directly upon the accounting department, and by the arrangement perfected the Accounting Association will be represented at the meetings of the Traffic Association.

WORK OF THE COMMITTEES

These remarks should not be brought to a close without mentioning, in some slight manner, the work done by the committees of this association. Each member of the standardization committee has exhibited the greatest interest in the work before the committee and has devoted a great deal of time and labor to preparation of various reports to the association. That their work has been recognized is proved by the adoption in every instance of the reports they have submitted, and almost invariably without change. Renewed interest has been taken in the question of lightning protection, and the committee on this subject made a report at the Louisville meeting which, taken together with the very able paper read at that meeting by E. J. Burdick, has caused earnest discussion among the members of the association. During the coming year this committee will without doubt make such recommendations as will be welcomed and adopted.

The insurance committee made its report during the past year, as a result of which an insurance expert was appointed, representing such member companies as may desire his services.

The subject committee has devoted a great deal of time to the selection of the many able papers that have been read before you and in securing some of the ablest writers and speakers to prepare and read these papers. It is not amiss to mention the fact that the preparation of these papers has required a great deal of study and much time, and that they have contributed beyond measure to the interest taken in the meetings.

The hotel committee has been one of our active committees, and its labors have not been in vain. Very few of the members of the association, outside of this committee, can fully appreciate the hard work and time occupied in perfecting the satisfactory arrangements for our meetings in the various cities within the past year.

The membership of the association represented by the supply men has been, and will continue to be, of vital interest to the welfare of the association. Through them many of the interesting subjects for discussion have been brought before the association. Their ideas, when brought out in these discussions, have been of inestimable value to every member company. Their interest and their enthusiasm in the association are unbounded, and their support in the past has proved this statement.

New committees have been appointed within the year as follows: Wood preservation—a subject of growing interest to every traction property in the country. We have had two very interesting papers upon this subject, and without doubt the committee will have many interesting and instructive reports to make to the association during the coming year. A new committee was recently appointed for work upon the question of uniform rules governing the cutting out of high-tension wires. This committee has done some work already, and, judging by its membership, will present to the association further reports upon this important subject.

GUIDE AND MAP

There was referred to the Traffic Association for final action the question of an official railway guide, with a result that a contract was made with the Central States Guide Company for the publication of train schedules in modern form. In this publication, under the head of each company, the announcement is made that the company is a member of the Central Electric Railway Association, should such be the case. The Traffic Association has also taken up the question of an official interurban map, which is now in the hands of the engraver.

In conclusion, I wish to express my heartfelt and sincere thanks to each and every member of the association and to the members of each and every committee for the very kind assistance they have given me during my incumbency. I wish to mention particularly the valuable services, not only to myself as your president but to the association as well, of your secretary, A. L. Neereamer, and to bespeak for the association and its future the hearty co-operation and very best efforts of your retiring president.

WOOD PRESERVATION AND ITS RELATION TO THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

BY FRANK P. SMITH, SUPERINTENDENT WAY AND STRUCTURES, INDIANAPOLIS, COLUMBUS & SOUTHERN TRACTION COMPANY

Reports from the Bureau of Census show that in 1909 the ties purchased for the renewals required for all steam and electric railroads amounted to 107,314,000. This represents a cut from approximately 420,000 acres, averaging 5000 ft. b. m., or it represents the annual growth on about 25,000,000 acres. At an average cost of 49 cents per tie at the point of production, then the cost for the purchase of these ties alone amounted to $52,600,000.

Considering now only the electric railroads belonging to the Central Electric Railway Association, we find that the total approximate mileage in operation is 3800 miles; allowing 2500 ties per mile, this means approximately 9,500,000 ties in service. Assuming 10 per cent of these as untreated, there are then approximately 8,550,000 untreated ties in service. Allowing an average life of five years, then the renewals annually required to maintain the above mileage amount to approximately 1,710,000 ties. On the basis of an annual growth of four ties per acre, 427,500 acres are required to furnish this material, while the total annual expenditure, on the basis of 64 cents per tie in place in track, amounts to approximately $1,094,000. On the other hand, if all of the ties now in use by these companies were treated so as to give an average life of fifteen years, the annual cut necessary would then only be one-third of that required under the present conditions; and, although to adopt the policy of now using treated ties for all annual replacements would for the first five years increase the actual annual expenditure, at the end of that time there would be a very marked reduction in the expenses for this purpose, and this amount would remain practically insignificant for a period of approximately ten years, when the cost for renewals would again increase for a five-year period.

DURABILITY AND COST OF TREATED MATERIAL

The foregoing figures tending to show the advantages of the use of treated material depend primarily upon the durability and the cost of such material, but there is now no reason to doubt that for practically all conditions these factors are sufficiently satisfactory to secure the advantages anticipated.

At the present time a large number of steam roads either operate their own treating plants or purchase large quantities of treated material. The following is a list of some of those which are known to be extensively using treated ties: Reading, New Jersey Central, Pennsylvania, Baltimore & Ohio, Lehigh Valley, Big Four, Illinois Central, Chicago, Rock Island & Pacific, Chicago & Northwestern, Chicago, Burlington & Quincy, Northern Pacific, Union Pacific, Chicago, Milwaukee & St. Paul, Louisville & Nashville, Missouri, Kansas & Texas, Texas & New Orleans, Atchison, Topeka & Santa Fé.

COSTS

Although it is impossible to give detailed cost figures which will be applicable to all conditions, yet the following figures at least approximate the cost of treating. In all cases the cost of the preservative is by far the greater item, and this will naturally vary considerably with every condition. The following estimates are based on the assumption that creosote costs 1 cent per pound (this is equivalent to about 8½ cents per gallon) and zinc chloride 4 cents per pound.

APPROXIMATE COST OF PRESERVING TIES 6 IN. X 8 IN. X 8 FT. COST OF CREOSOTE, 1 CENT PER POUND. COST OF $ZnCl_2$, 4 CENTS PER POUND.

Amount Injected (per cu. ft.)	Seasoning.	Labor.	Fuel.	Maintenance.	Chemicals.	Totals.
Creosote .....10 lb.	$0.01	$0.06	$0.01	$0.005	$0.266	$0.351
Creosote ..... 6 lb.	0.01	0.06	0.01	0.005	0.159	0.244
Zinc chloride..½ lb.	0.01	0.06	0.01	0.006	0.053	0.139
Creosote and zinc chloride. 3 lb. creosote and ½ lb. zinc chloride	0.01	0.06	0.01	0.006	0.132	0.218

SELECTION OF TIMBER

It is well known that the natural durability of different species varies widely, but it is probably not so generally recognized that in nearly all cases the naturally durable timber is less susceptible to treatment than the less durable and cheaper species. For example, the white oak tie is very resistant to treatment, while the red oak is comparatively susceptible, and when so treated the latter will resist decay more effectively than the former, in either the untreated or treated condition. Therefore, although when untreated ties are to be used the naturally durable species will quite properly command a higher price than the less durable species, yet if the ties are to be treated this relationship should change. For example, although a chestnut tie is naturally more durable than a beech, it is much more difficult to treat, and for this reason, if the material is to be treated, the chestnut tie, from an economic standpoint, should be secured at a lower initial cost than the beech. The following table shows the estimated life of various untreated and treated ties, and may be of assistance in determining the relative merits of different species for purposes of preservation:

ESTIMATED LIFE, IN YEARS, OF UNTREATED AND TREATED TIES IN THE UNITED STATES, ALL TIES PROPERLY TIE-PLATED.

	Untreated.	Treated With. 10 lb. Creosote, per cu. ft.	½ lb. Zinc Chloride, per cu. ft.
Black locust	20	..	..
Redwood	12	..	..
Cedar	11	..	..
Cypress	10	..	..
White oak	8	..	..
Longleaf pine	7	20	11
Chestnut	7	14	11
Douglas fir	6	15	11
Spruce	6	14	11
Western pine	5	17	12
White pine	5	14	10
Lodgepole pine	5	16	11
Tamarack	5	15	11
Hemlock	5	15	11
Red oak	4	20	11
Beech	4	20	12
Maple	4	18	11
Gum	3	16	11

The relative value of sawn and hewn ties should also be considered. For most conditions sawn ties are recommended. Not only is the percentage of waste incident to the cutting of the tie less with sawn ties than with hewn, but a sawn tie when treated is more desirable. Hewn ties frequently have to be adzed when placed in the track, and for this reason there is a constant danger that a section will be cut through the treated zone, which will admit the decay-producing organisms.

Ties containing much sapwood are also preferable to heart ties. Sapwood, although naturally less durable than heartwood, is far more susceptible to treatment, and when so treated will outlast the untreated heartwood.

HANDLING AND PREPARATION OF TIMBER

All ties or other timber should be completely peeled before using, and for most conditions, especially if the material is to be treated, it should be thoroughly seasoned. Unpeeled timber will decay much more rapidly than when peeled, and, furthermore, the bark is very resistant to impregnation. Seasoning is now generally conceded to be advantageous if the material is to be treated, as green timber is very resistant to the entrance of the preservative. Figs. 1 and 2 illustrate the effect of peeling and seasoning on the treatment.

Where ties or other timber is to be held, either with a view to seasoning or for storage for limited periods, they should be piled so as to admit a ready circulation of the air, and in all cases the bottom layer of the pile should be supported by timbers or stringers to prevent its coming in contact with the ground. A proper seasoning yard should

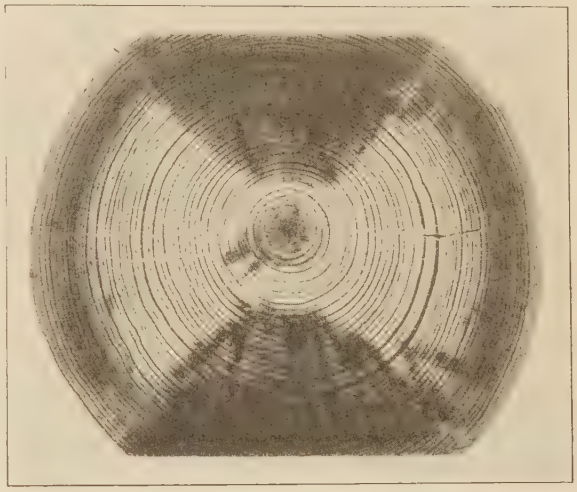


Fig. 1—Wood Preservation—Section of Creosoted Short-Leaf Pine Tie

This tie was slabbed on two sides and seasoned for several months. Bark was then removed from the two sides and the tie treated. Note effect of penetration.

be free from weeds, long grass, etc., should be well drained and, if possible, exposed to the prevailing winds. Where material shows a tendency to check while seasoning, this may be reduced by the use of "S" irons. It has been reported by a representative of a company using such irons that the cost per iron in place in the tie was approximately 1 cent.

SELECTION OF PRESERVATIVE

Coal-tar creosote is the preservative most extensively used in the United States. It weighs approximately 8½ lb. to the gallon and costs from 6 to 15 cents per gallon, according to the locality and quantity purchased. The chief points in its favor are the long period over which it has been used and its known efficiency as a preservative. Its chief disadvantages are its comparatively high cost and difficulty in handling. It will, however, probably continue to be extensively used.

Zinc chloride is the other preservative widely used in the United States. This preservative is injected into the wood in the form of an aqueous solution, but owing to its solubility in water it has a tendency to leach out of treated material and eventually leave it unprotected. This is its chief disadvantage, while its low cost of approximately 4 cents per pound, together with its high antiseptic properties, are points in its favor. It is not, however, recommended

for use in wet localities or where the mechanical life of the timber is sufficient to warrant protecting it from decay for a long period.

Other preservatives which are used to some extent are crude oils and creosote from water-gas tar. Such preservatives depend primarily upon their waterproofing properties for their success, but authentic data are not at present

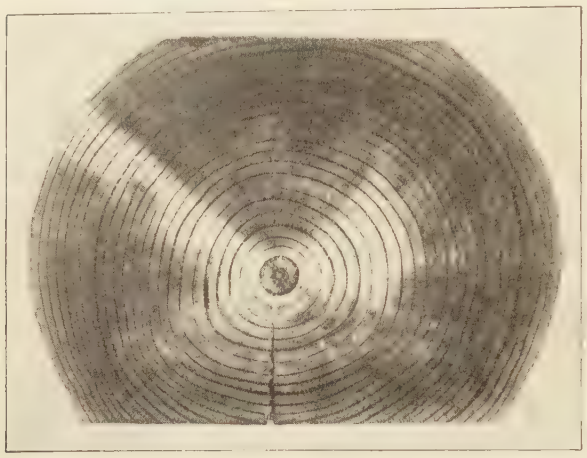


Fig. 2—Wood Preservation—Section of Short-Leaf Pine Tie Treated with Creosote

After treatment it was found that a fine, thin strip of bark was adhering to the tie over the surface of the unpenetrated streak. This illustrates the effect of bark in retarding the entrance of the preservative.

available to determine just what results may be anticipated with such oils.

METHOD OF TREATMENT

In applying the preservative the main point to be considered is to secure a maximum penetration. Briefly, the processes in commercial use may be divided into full cell, empty cell and combination treatments. The first method is used with all salts, such as zinc chloride, with crude oils, and to some extent with creosote. In this method as much of the preservative as possible is forced into the wood, thus leaving the intercellular spaces completely filled with the preservative. Where ties are protected with plates and screw spikes from mechanical wear such treatments with creosote have been very successfully used, especially in Europe, but the initial cost is necessarily high.

With a view to reducing this high cost, the empty cell processes were developed. In these processes a large quantity of creosote is first forced into the wood, after which a certain portion of this is removed, the idea being to save the preservative which would otherwise be contained in the intercellular spaces. Such processes have not been used for a sufficient period to determine the average increase in life which may be expected.

In the combination treatments the material is treated both with zinc chloride and creosote with a view to retarding the leaching of the zinc chloride from the timber for a sufficient period to give it a service equal to its mechanical life. With heavy wheel loads and much traffic where the ties are not tie-plated such treatments may prove efficient.

It is, of course, impossible to recommend any given preservative or process which should be generally adopted by these companies, but in deciding this point especial consideration should be given to the probable mechanical life of the tie and the conditions under which it is to be set. As damage from mechanical wear is probably not extensive on most of the electric roads, it seems probable that a treatment which will insure protection from decay for a long period would be advisable.

INDIVIDUAL AND CO-OPERATIVE PLANTS

There are three distinct ways in which the companies forming the Central Electric Railway Association may adopt the use of treated timber. These methods, with the main advantages and disadvantages of each, are briefly as follows:

1. Individual companies may ship the material to commercial plants for treatment or they may purchase treated material directly from these plants.

The advantages of this plan are a saving in the immediate expenditure which would be necessary for the installation of a treating plant and an avoidance of the trouble of operating a small plant and of the expenses of employing a man sufficiently trained to operate such a plant to the best advantage.

For companies with limited mileage of less than 100 miles this method would probably prove more advantageous than the installation of a small treating plant.

The disadvantages are a lack of exact knowledge regarding the character of the preservative used, the quantity injected and the details of the treatment followed.

To secure this information a competent inspector familiar with all the details of plant operation should be present at the treatment of any of the material. It is most probable that much timber which should be treated and would doubtless be treated if a company operated its own plant would, under this arrangement, be used in an untreated condition.

2. Individual companies may install their own treating plants.

The advantages of this plan are that practically all timber which should be treated would undoubtedly be treated, the exact character of the preservative, methods of treatment and the quantity injected would be known, and the company would be certain that it was getting what it paid for. The cost of plants treating timber in comparatively small plants should not exceed the cost charged at commercial plants for treating similar timber in a similar way.

The disadvantages would be the initial expenditure for the plant and the trouble of operating it.

As timber can be treated more cheaply in large plants than in small ones, it would probably not be advisable under most conditions for a company operating less than 100 miles to install a plant with cylinders designed to withstand the customary working pressures. Since approximately 79 per cent of the companies belonging to the Central Electric Railway Association operate less than 100 miles of track, this method would not appear to be the most advisable for the entire association.

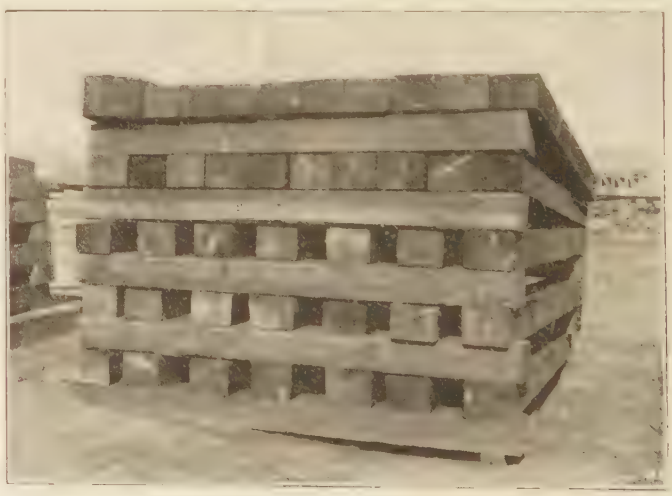


Fig. 3—Wood Preservation—Good Method of Piling Ties for Seasoning

3. The companies may co-operate in the installation of one or more joint or central plants to treat their own material.

The advantages of this plan may be summarized as follows: Practically all material which should be treated could readily and advantageously be treated; exact knowledge of the preservative, character of treatment and quantity of

preservative injected would be known at all times; the unit cost of treating should be lower than in either of the two previous methods mentioned; the plant would be sufficiently large to operate economically; the preservative could be purchased in large quantities with a correspondingly low cost; a competent man could be economically employed to supervise the operation of the plant; the selection, inspection and purchase of timber could be economically handled through such a central plant, inspectors being employed for that purpose. This would result in a better selection of the timber, in greater economy in buying and in a more scientific selection of different species to be used for different conditions. This central timber department could also operate largely with a view to securing a tie supply in the future, assisting owners of wood lots and timber lands to a proper management of their holdings, with this end in view.

One disadvantage of this plan is that the initial expenditure required for the installation of a central plant would be comparatively large. However, if shared by the different companies on a basis of mileage in operation, the cost to each company would undoubtedly be less than if individual plants were installed. The cost of distributing the treated material might be considered a disadvantage, but it should not ever be greater, and in many cases would doubtless be less, than if the material was purchased from a commercial plant.

From the foregoing it would seem that the installation of one or more joint or co-operative treating plants would be the most efficient method to be followed. The approximate size of such a plant can be roughly estimated as follows:

Approximate total mileage operated by companies belonging to the Central Electric Railway Association, 3800 miles.

Approximate ties in service (2500 per mile), 9,500,000.

Assuming 10 per cent as treated, the approximate number of untreated ties in service equals 8,550,000.

Assuming an average life of five years, the approximate annual renewals amount to 1,710,000 ties.

A plant sufficient to treat this quantity of ties annually on the basis of three treatments per day in each cylinder for 250 days a year would consist of three treating cylinders 7 ft. in diameter by 115 ft. long, or two cylinders 7 ft. in diameter by 172 ft. long.

Considering further, however, it will be seen that if such a plant were installed and one-fifth of the ties now in service were treated annually, then at the end of five years the quantity of material to be annually treated would greatly diminish, and eventually only about one-third of the present annual replacements would be required. As a rough approximation it would seem, therefore, that a plant with two cylinders 7 ft. in diameter by 115 ft. long would about meet the requirements. If such a plant was installed it is probable that all of the ties figured upon would not be immediately treated each year, and, of course, it might be possible to increase the output of the plant beyond the estimated amount. On the other hand, at the end of the five-year period the practice of using treated timbers should have become so established that many forms of timber, such as cross-arms, poles, posts, bridge timbers, crossing planks, etc., would be treated in addition to the ties, and the demand for treated timber would not reach the extreme low limit which might be estimated.

A plant of this capacity (two cylinder, 7 ft. by 115 ft.) would probably cost in the neighborhood of $100,000, exclusive of the value of the land. Possibly two plants, each having one cylinder and situated in different sections of the territory covered by the companies of the association, might prove more advisable, but this point, of course, can only be determined by more careful investigation and consideration of many important points. Should your committee and the members of the association feel that the installation of a joint plant is worthy of consideration, I would suggest that authentic information be secured on the following points:

Prices on ties and other forms of timber from local dealers as well as those of the South and other available points.

Prices on treated material of various forms and species from different commercial treating plants, prices being made f. o. b. definite points in the territory covered by the companies of the association. A list of the wood-preserving plants in the United States is appended.

Freight rates on timbers from the South and other available points to definite points in the territory covered by the companies of the association.

Figures on cost of transporting treated material from a central plant situated at some given point to various points on the lines of the companies of the association.

Information as to the probable site for the location of one or more joint plants, which, in conjunction with the foregoing information, would involve the following:

Available timber in Indiana, Ohio and Michigan.

Labor conditions at any point under consideration.

Difficulties to be experienced in shipping preservative to the plant and distributing the treated material from the plant.

In addition to the foregoing, the information covered by the following points would be of assistance and could probably be secured by sending circular letters requesting it to the various companies of the association:

1. Miles of track in operation.

2. Number of ties, poles, posts, cross-arms, bridge timbers, etc., in service, noting species used and approximate date of placement.

3. Quantity of above material which is treated and character of treatment used.

GENERAL ELECTRIC LIGHT-WEIGHT MOTORS

BY W. D. SARGENT, GENERAL ELECTRIC COMPANY

In the construction of the GE-203 light-weight box-frame motor there are marked improvements which make it, in many respects, superior to motors heretofore developed, especially those of split-frame type. Some reasons why the box motor is preferable to the split-frame motor from an operating standpoint are: Smaller number of parts to maintain, better method of holding the armature head and bearings, magnet frame cast in one part and better provision for ventilation.

The GE-203 motor has a rating of 50 hp on 600 volts and 40 hp on 500 volts. The distinctive features described in the following paragraphs are characteristic of this type of motors.

FRAME AND LUBRICATION

The suspension lugs on the magnet frame are cast with a safety projection over the top to prevent the motor from dropping if the suspension bolts become loose or break. The frame is so designed that the axle can be inclosed completely between the commutator end and pinion end axle bearings. The motor has a sheet-steel guard which incloses the axle between these points and prevents the dirt and water from entering the bearings and causing excess wear of the linings. The axle collar is made with a flange overhanging the flange of the axle-bearing lining on the commutator end, and on the gear side the gear case extends over the bearing lining flange, thus preventing grit, etc., from entering at this point and cutting out the flanges.

The axle caps are tongued and bolted to machined surfaces, which are inclined at approximately 60 deg. from the horizontal, and the axle linings are held with hardened keys. The bearings are lubricated with oil and waste. The axle caps have auxiliary oil wells for oiling the bearings and for gaging the depth of oil in the well.

The oil and waste pockets have a separate chamber cast integral with the head for oiling the bearings. This cham-

ber may also be used for gaging the depth of oil in the well. The malleable iron covers have a felt lining and are held down by a spiral spring to allow easy access.

The frame heads are supported in the bored openings in either end of the magnet frame and have a driving fit in the frame. They are also held securely by four horizontal tap bolts, which are prevented from turning by plate lock washers. Each frame head has two tapped holes diametrically opposite, into which bolts may be screwed and the frame heads forced off. The frame head, axle cap and gear-case bolts are of oil-tempered alloy steel.

The armature-bearing linings are made of G. E. standard No. 17 alloy bearing metal. The linings are held by means of keys, so that they cannot work out and turn in the housing, as is frequently the case when dowels are used.

THE FIELD COILS

The field coils are wound with strip copper and insulated between turns with strip asbestos and between decks with flexible mica. The commutating field coils are insulated like the exciting coils. After being completely wound, all field coils are compounded in the vacuum treatment, which fills the coils thoroughly and renders them homogeneous. After being thoroughly cleaned of compound the coils are wrapped with varnished cambric and tape and the coil is submerged in insulation varnish to make it practically impervious to moisture. The field coils are held in the frame against a one-piece sheet steel support, which is made to fit the contour of the coils, and clamped between the pole pieces and magnet frame by means of L-shaped sheet steel spring flanges which rest against the pole tips. This construction insures a smooth, even surface for the coil and eliminates abrasion, both during assembly and after the coil is in the motor. All field coil cables are made with a copper ferrule over the end of wires, which is inserted into the terminals to prevent the cable from being injured when the terminal screws are set down.

BRUSH-HOLDERS

The brush-holders are of mica-stud construction, which consists of two mica-insulated studs pressed into a drop forging. The top support, which is secured to the finished seats in the magnet frame, is saw-cut through on one side so as to clamp tight around the stud when the tap bolts are set up. It also allows the support to be removed easily for repair without danger of breaking the porcelain bushing. The brush-holders have a ratchet for adjusting the spring tension to any desired pressure. The spring which actuates the fingers gives a slight pressure on the pin on which the fingers pivot, thus reducing the wear to a minimum. The brush-holder bodies are secured to the brush-holder supports on machined seats. This permits adjustment to suit the wear of the commutator and insures accurate spacing of the brushes. The tap bolt which secures the brush-holder to the support is locked to prevent turning, and ample wrench clearance is allowed between studs for tightening the bolt. The brush-holder bodies can be removed or replaced without disconnecting the cable leads, since the leads are attached to the support on which the body is bolted.

ARMATURE AND COMMUTATOR

The armature laminations are built up directly on the shaft with the armature nut outside of the commutator. Tapped holes are provided in the pinion end armature head, so that by inserting three bolts through the ventilating duct in the core the structure can be held securely together, and, by removing the armature nut, the shaft can be pressed out and a new one substituted without disturbing either the windings or the commutator.

The armature shaft is made of oil-tempered material. The shaft journals are ground and rolled to size. The punching and pinion keys are made of armorized steel, ground to size. The thrust collars are made from drop forgings and have the wearing face case hardened and ground.

The armature is of the barrel type winding with standard size round wire. The coils are insulated with varnished cambric and cotton tape treated in insulating varnish. The armature, after being completely assembled and soldered, is placed in an oven and thoroughly heated, and while hot is temporarily bound with steel wire over the entire core and end windings, the temporary binding being left on until the armature is cold. It is then removed and the permanent bands are run on. By this method of binding the coils are set down firmly into the slots and on the core heads before the permanent bands are put on, thus insuring tight bands with less liability of any movement of the coils when the armature is in service.

The commutator shell and cap are steel, the cap being a drop forging and the shell a steel casting. The commutator is insulated with mica and the machined surfaces of the segments are hand-engraved, to remove any and all small bars of copper which may have been dragged over from bar to bar during the turning operation. The commutator is mounted directly on the shaft and is secured by the armature nut.

GEARING

The gear case is of sheet steel thoroughly riveted and welded and is supported from three points to prevent destructive vibration. The gears are made of cast steel and the pinions of specially treated forged steel. Both gear and pinion have cut teeth.

VENTILATION

This motor has exceptionally good ventilation. By means of a blower arrangement, made integral with the pinion end armature head, the air is circulated over the armature and field coils and drawn under the commutator and through longitudinal holes in the armature core. In this way all parts of the motor are ventilated thoroughly and kept at a uniform temperature. The motor is so constructed that air may be taken from the outside of the motor frame either close to the opening in the frame or from the side of the truck as may be convenient or desired and drawn through the motor and exhausted through openings provided in the pinion end frame head.

WEIGHT, HANDLING, ETC.

The weight of the motor is approximately 2150 lb. complete with gear and gear case. Great saving in weight was secured by the use of exceptionally high-grade materials throughout and by taking full advantage of the possibilities in electrical design of a commutating pole motor.

One point is the method of handling the box motor in the carhouse. It is necessary to remove the motor from under the car body before undertaking to disassemble the motor; however, this is not objectionable, as workmen employed in a dark, damp pit under a car cannot work as well as when working on the main floor with good light and plenty of space. After being removed from the truck the motor may be set in any convenient place and the bolts which hold the pinion end frame head taken out, the head with armature forced off toward the pinion end and armature and the head lifted out, thus giving free access to the interior of the motor. It is not necessary to remove the pinion from the shaft during this operation, neither is it necessary to remove the commutator end frame head. Hence the removal of the armature is an operation requiring a comparatively short time. If desired, an armature removing tool may be used to lift the armature out of the motor, but it is not essential with a light weight motor like the GE-203. All box-frame motors have hand holes for the inspection of the interior of the motor from underneath the car and are so located as to be accessible from the pit.

Everything considered, the box-frame light-weight motor is the best proposition for a railway and will do more toward keeping down the operating and maintenance costs than anything else which has been brought out for a number of years.

Papers at the Milwaukee Meeting

C. N. Duffy Discussed Rates of Fare and the Return on the Investment—J. L. Davis Described Recent Developments in Car Equipment—Other Important Topics Considered in the Abstracts Published

ELECTRIC UTILITIES

BY C. N. DUFFY, COMPTROLLER MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

With reference to the rate of return of the electric railways of the United States, as given in the 1907 census report, and Table I, published on page 105, showing average percentages of increases from 1902 to 1907 of certain statistics bearing upon results of their operation, a consideration of some of the facts in relation thereto should be of interest and importance.

The causes which have brought about these decreases in the rates of return on investment are increased investment and operating costs, due to the enormous increase in cost of labor and materials, as ties, 72 per cent; bridge timber, 80 per cent; fuel, 38 per cent; steel rails, 47 per cent; increased expenses for damages and legal expenses; use of larger and heavier cars, resulting in increased maintenance cost and power consumption from 1.98 kw-hours per car mile in 1902 to 2.94 kw-hours in 1907, an increase of 0.96 kw-hour or 48 per cent; increased number of passengers carried on free transfers, 22.25 per cent of revenue passengers in 1902, as compared with 26.80 per cent in 1907, an increase of 4.55 per cent or equal to 20 per cent.

The percentage of revenue passengers carried on transfers on the Milwaukee city system in the year 1910 was 36.49 per cent, approximately 10 per cent more than the average of all of the electric railways of the United States in the year 1907, equivalent to 36 per cent more transfer passengers carried.

As to increased cost of labor, labor being over 60 per cent of the total operating expenses, the average annual wages per wage earner increased from $600.62 in 1902 to $658.33 in 1907, an increase of $57.71, approximately 10 per cent.

The payroll of The Milwaukee Electric Railway & Light Company and of the Milwaukee Light, Heat & Traction Company for the year 1910 aggregated $2,409,687, an average of $771 per wage earner per annum, 17 per cent more than the average per wage earner per annum of all of the electric railways of the United States, as per the United States Census for 1907. The company has voluntarily increased the rate of pay of its conductors and motormen during the past fourteen years over 40 per cent, while the average rate of fare per passenger in the same period decreased over 20 per cent.

The wages of conductors and motormen are the largest single item of expense in the operation of an electric railway, being nearly one-fifth of the total of the Milwaukee city railway system, or over ½ cent per passenger. The exact figures for the year 1910 were 0.61 cent.

The possibility of reducing operating costs of electric railways may as well be dismissed from consideration, in view of the fact that the limit of economy in the management of the properties, consistent with safe and efficient operation, has been practically reached with the prevailing costs of labor and material.

The conditions of the business, as disclosed by the census statistics, cannot continue, and it may be necessary to do some or all of the following: (a) abolish free transfers; (b) inaugurate some zone system of fares; (c) increase the rate of fare; (d) reduce or abolish taxes; (e) establish municipal ownership and operation, financial deficits to be made good by the taxpayers.

With reference to suggestion (d) the taxes of The Milwaukee Electric Railway & Light Company and of the Milwaukee Light, Heat & Traction Company in the fifteen years from 1897 to 1911 increased 502 per cent; the gross revenue in the same period increased 266 per cent. In addition to its direct taxes, the company has other burdens in the nature of taxes. On the Milwaukee city railway system it is obliged to keep the paving in repair between and for 1 ft. adjoining its tracks, to sprinkle its roadway, to remove snow from its tracks, to supply electric power for the operation of the city bridges used by its cars, and to furnish free transportation for members of the city fire and police departments. The total taxes levied and tax burdens imposed are approximately 8 per cent of the company's annual gross revenue. On the Milwaukee city railway system this was equivalent in 1910 to over one-third of 1 cent per revenue passenger carried. Taxes are a part of the cost of furnishing street railway transportation and must be borne ultimately by the users of the service. The company, like every good citizen and property owner, desires to pay and should pay its fair share of taxes, but the users of the service should not be taxed to relieve the general taxes.

RATE OF RETURN IN MILWAUKEE

The rate of return of The Milwaukee Electric Railway & Light Company on its railway investment, as shown by the testimony in the 3-cent fare hearing before the Railroad Commission of Wisconsin, varied from 4.37 per cent to 5.92 per cent, dependent upon the basis taken as to what constituted the cash investment in the railway property. The average dividends paid on the common stock of the company, invested in its combined railway and lighting business, averaged for a period of fourteen years, from 1897 to 1910, 3.55 per cent.

This means that, with all of the risks of the business assumed and carried, the rate of return has been practically only what has been allowed by banks as interest on savings deposits, or, to put it in another way, a little more than one-half farm mortgage interest, without the usual security of two for one in farm lands. Moreover, nothing is allowed or provided for interest on working capital, extraordinary contingencies or amortization of investment, and depreciation charges are taken on the books to the extent of approximately only 50 per cent of the average depreciation sustained by the railway property for the ten years beginning Jan. 1, 1897, and ending Dec. 31, 1906, as shown by the inventory and physical valuation made by the Railroad Commission of Wisconsin.

This rate of return is wholly inadequate from the standpoint of the investor, independent of the hazards of the business. It is not sufficient to attract capital for necessary extensions and additions or the proper development of the business.

This is especially true of electric railways, the industry being practically at a standstill for the reasons referred to.

Capital was invested in these enterprises in the early days of the electrical industry with a full realization of the risks assumed, but with the expectation that the development of the business would in time bring adequate returns commensurate with the uncertainties attending the undertakings.

Investors have lived on in the hope that the business would some day be on a basis that would yield them a proper return on their investment, but the hope has not yet been realized, and from present indications and conditions will be long deferred. The investment has been made, however, cannot be realized on, therefore there is nothing for the investors to do but wait and hope.

DISPOSITION OF REVENUE PER PASSENGER

From the average revenue per passenger (including transfers) of the Milwaukee city railway system for the year

1910, 3.12 cents, there remained only .03 cent, less than 1 per cent, after taking care of current ordinary operating expenses, depreciation charges, taxes and interest charges. These charges are shown in Table II on page 105.

With adequate estimated depreciation charges taken on the books and a 6 per cent dividend on the common stock, it would require 0.15 cent more than the 3.12 cents revenue per passenger received, or 3.27 cents, to meet these charges. Therefore the average cost in Milwaukee for the year 1910 of carrying each of the 120,744,648 passengers carried during that period was 3.27 cents, exclusive of interest on working capital, provision for extraordinary contingencies or amortization of investment.

LENGTH OF RIDE IN MILWAUKEE

The longest ride possible in Milwaukee in 1890 for 5 cent was approximately 4 miles, or 1¼ cents per mile; the ride under horse-car conditions consumed about forty minutes.

The longest ride possible in Milwaukee in 1911 for 4 cents was approximately 12 miles, or one-third of 1 cent per mile; the ride under electric-car conditions is made in about eighty minutes.

The length of ride in Milwaukee for one fare has increased 200 per cent, three for one, while the time consumed increased only two for one and the rate of fare per mile decreased nearly 75 per cent; in other words, a passenger pays per mile in 1911 for an electric-car ride about one-fourth of what was paid for a horse-car ride in 1890.

BENEFITS OF ELECTRIC RAILWAY OPERATION TO THE COMMUNITY

The average rides per capita per annum on the Milwaukee city railway system in 1910, taking the population served as 375,000, were 235.

The saving of 1 cent on each ride in 1910, on the basis of a 4-cent fare, as compared with 5 cents in 1890, would be equivalent for the entire population served to $881,250, or nearly 4 per cent on the company's capitalization invested in the city railway system, as of Dec. 31, 1910, taking the capitalization as $22,182,400.

Assuming that 75,000 of the 375,000 of the population of Milwaukee served are heads of families, on the basis of a ratio of five to one, and that each of these heads of families saved in time during 1910, on the average, the equivalent of one hour per week, the value of their time saved, figured at 20 cents per hour, would be equivalent to $780,000 per annum, or over 3½ per cent on the company's capitalization invested in the city railway system, as of Dec. 31, 1910.

From this it will be seen that in 1910 the population of Milwaukee, by reason of the decreased fare and electric car operation in 1910, as compared with the old rate of fare and horse car operation in 1890, saved $1,661,250, equivalent to approximately 7½ per cent on the company's capitalization invested in the city railway system Dec. 31, 1910. This is more than twice the average annual dividend rate on the common stock of the company since its organization in 1897.

In addition to these direct benefits, there are indirect benefits secured by the people of Milwaukee in the opening up of new territory in different portions of the city and the outlying districts contiguous thereto for factories and homes. These extensions have improved the working and living conditions of the people, reduced the congestion in the downtown factory and tenement districts and added enormously to the taxable value of the property of the city and to the taxes paid thereon.

This is a particularly important point in view of the agitation now going on with reference to better housing conditions for the working classes.

The company has always made extensions in advance of the population. The people follow the extensions; the extensions do not follow the people.

Another benefit has been the employment furnished labor and the consumption of material and supplies incident to the construction and operation of the street railway system, all of which redounds to the benefit of the city at large. The company's annual payrolls alone approximate $2,500,000.

SOME ELECTRIC RAILWAY PROBLEMS IN MILWAUKEE

There are many difficult problems surrounding the operation of the Milwaukee street railway system concerning which the public has but a limited knowledge.

In order to accommodate the traffic during the rush hours, morning and evening, which do not extend beyond three hours of the twenty-four and in which approximately 40 per cent of the total passengers carried must be transported, the company is obliged during the morning and evening rush hours more than to double the regular number of cars operated. This means that the company must have an investment of a large amount in cars, power plants, carhouses, shops and land, upon which the carrying charges (depreciation, contingencies extraordinary, taxes and interest) for twenty-four hours of the day and 365 days in the year must be earned, with approximately three hours' use of the investment for 300 working days in the year—an impossible task, as must be apparent to any thinking mind. This is best illustrated by the fact that the number of passengers carried per car-mile, on the average, for twenty-four hours' operation, is less than 20 per cent of the seating capacity of the cars; in other words, over 80 per cent of the seating capacity of the cars per car-mile, on the average, is not used.

In addition to the financial problem involved with respect to the operation of extra cars during the rush hours, there is the difficulty of manning the extra cars, that is to say, the difficulty of maintaining an adequate extra force, in order that the problem may be handled to the satisfaction of the employees, the public and the company.

Assuming that the "financial problem" and the "labor problem" are both satisfactorily met, there is the problem of moving the cars on the streets during the rush hours through an extremely limited and congested area, restricted in the downtown district to practically two east and west streets and two north and south streets. This problem becomes more difficult because of traffic interruptions caused by bridges and railroad crossings.

Some idea of the congestion in the downtown district may be had when it is stated that for a considerable portion of the time during the rush hours there is a car practically every ten seconds crossing Third Street and Grand Avenue, with city cars turning into and out of Grand Avenue on one side of the street and interurban cars on the other side of the street.

The company is heartily in accord with Mayor Seidel in his position with reference to the necessity of wide streets, a most important question in any city, particularly in Milwaukee in the downtown district.

In 1910 the company carried approximately 330,000 passengers a day during the twenty-four hours and approximately 132,000 were within a period of three hours. This latter figure means 44,000 per hour, or an average of eighty-seven passengers per car, assuming that the company had on the streets during the rush-hour period its entire equipment of 506 cars (396 city cars and 110 interurban cars) and was able to move them through the streets.

GLASGOW CORPORATION TRAMWAYS

We frequently hear much regarding the low rates of fare and successful operation of the Glasgow Corporation Tramways in Scotland, a municipally owned and operated electric railway, but the difference in conditions and the analysis thereof are seldom, if ever, referred to.

The average revenue per passenger for the year ended May 31, 1911, as per the official report of the company, was, in American money, practically 2 cents, but the average fare charged per mile was 0.46 penny, equivalent to approximately 0.92 cent in American money.

The average rate of fare per mile in Milwaukee charged by The Milwaukee Electric Railway & Light Company, per

length of ride offered, is approximately 0.40 cent, less than one-half the average fare charged per mile by the Glasgow Corporation Tramways.

The "scale of fares," as set forth in the annual report of the company, varies from ½ penny to 7 pence, which, expressed in American money, is approximately from 1 cent to 14 cents. The "average distance (miles)," as set forth in the report, varies from 0.57 for the ½-penny fare to 14.74 for the 7-penny fare.

While the average fare paid during the year ended May 31, 1911, was a trifle under 2 cents, the cost of the ride was practically 1 cent per mile, more than double the average rate per mile in Milwaukee, based on the length of ride offered.

The rate of wages paid the Glasgow Corporation Tramways' conductors and motormen is about one-half that paid in Milwaukee.

The Glasgow Corporation Tramways, serving three times the population served by The Milwaukee Electric Railway & Light Company, has only about 40 per cent more trackage and operates less than twice the number of cars operated by The Milwaukee Electric Railway & Light Company, but the Glasgow Corporation Tramways' cars carry nearly three times as many revenue passengers as The Milwaukee Electric Railway & Light Company's cars carry.

The Glasgow Corporation Tramways' cars carry approximately 45 per cent more passengers per car than The Milwaukee Electric Railway & Light Company's cars, although the carrying capacity of the Glasgow Corporation Tramways' cars is only about 50 per cent of The Milwaukee Electric Railway & Light Company's cars.

The trackage and car statistics clearly show the congestion of population in Glasgow, which, with its attendant evils, is most unfortunate and well understood.

CLEVELAND 3-CENT FARE

Much has been said in the newspapers of the country regarding the acquisition (confiscation would have been the better term) of the Cleveland Railway system by the late Tom L. Johnson, who was Mayor of Cleveland at the time the railway system was "taken over," or rather "confiscated," on a basis which meant to the stockholders a loss in their investment of approximately 45 per cent, and the inauguration of the 3-cent fare, without transfer, however.

The mismanagement of that property, from the standpoint of the public as well as the stockholders, threw the property in a short time in the hands of a receiver, although Mr. Johnson had repeatedly declared that the operation of a street railway system in Cleveland on a 3-cent fare would prove an extremely profitable investment, and that the service, in so far as the public was concerned, would be far superior to the service formerly given by the Cleveland Railway Company. The results were just the reverse.

The United States District Court took the property out of the hands of the receiver and turned it over to the old stockholders. The property is now being operated under an ordinance framed by the late Judge Tayler. The ordinance was passed by the Common Council and ratified by the voters of Cleveland, although the adoption of the ordinance was bitterly fought by Mr. Johnson.

Under the terms of the ordinance the property was to be operated experimentally on a 3-cent fare with 1 cent additional for a transfer. If the results did not yield 6 per cent on the investment, the fare was to be increased; if the results yielded more than 6 per cent on the investment, the fare was to be decreased.

There is no doubt that the fare will have to be increased ultimately, but at the present time the rate of fare is 3 cents with an additional charge of 1 cent for a transfer on all lines within the city limits, the 1 cent being returned upon presentation of the transfer on the car of the second line within the time fixed by the company's regulations. Free transfers are issued to and over cross-town lines.

The receipts from these rates of fare are not sufficient to provide Cleveland with good service and the proper upkeep of the property and to leave sufficient surplus for accruing depreciation and contingencies; nor is the 6 per cent return allowed under the ordinance sufficiently large to attract the necessary capital needed for the extension of lines and the proper development of the property.

The company began operating on a straight 3-cent fare on June 1, 1911, and during the four months ended Sept. 30, 1911, the interest fund had been reduced approximately $200,000. It is estimated that in four months more it will be reduced an additional $200,000, or from $700,000 to $300,000.

Under the ordinance, when the interest fund is reduced to $300,000, the fare is to be raised automatically.

The loss to the stockholders of the Cleveland Railway Company of about 45 per cent of their original investment draws attention to similar conditions with respect to the street railway systems of Chicago, Detroit and Toledo, where franchises have expired or are about to expire, and emphasizes the necessity of providing not only for the depreciation, obsolescence and inadequacy of the physical property, as well as public requirements, but also for the preservation of the entire capital invested, intangible as well as tangible. This can be accomplished only by charging a rate of fare that will provide adequately for depreciation in all of its phases, extraordinary contingencies and amortization of investment.

TABLE I—SHOWING AVERAGE PERCENTAGES OF INCREASE FROM 1902 TO 1907 OF CERTAIN STATISTICS BEARING UPON RESULTS OF OPERATION OF ELECTRIC RAILWAYS OF THE UNITED STATES, AS PER UNITED STATES CENSUS BULLETIN DATA.

	Per Cent
Length of track	52.4
Investment	63.5
Earnings from operation	68.9
Operating expenses	76.6
Net income (after deducting operating expenses, taxes and fixed charges)	31.00
*Net income (after deducting operating expenses, taxes and fixed charges) per mile of track	13.46
Revenue passengers	55.9
Transfer passengers	87.8
Number of salaried employees	64.1
Amount of salaries	73.5
Wage earners	56.9
Amount of wages	71.00
Damages and legal expenses	93.3
Consumption of energy per car mile (kw-hours)	48.48

*Decrease.

TABE II—SHOWING DISPOSITION OF REVENUE PER PASSENGER OF THE MILWAUKEE CITY RAILWAY SYSTEM FOR 1910.

	Amount (Cents).	Per Cent. of Total.
Way and structures	0.18	5.77
Equipment	0.18	5.77
Power	0.30	9.60
Wages of conductors and motormen	0.61	19.55
Miscellaneous transportation expenses	0.19	6.09
General expenses	0.10	3.20
Injuries and damages	0.13	4.17
Undistributed expenses	0.04	1.28
Depreciation charges as taken on books	0.31	10.00
Taxes	0.22	7.00
Interest charges	0.52	16.67
Surplus (exclusive of common stock dividends)	0.34	10.90
	3.12	100.00
Surplus (exclusive of common stock dividends)	0.34	
Depreciation charges not taken on books	0.31	
Surplus (after providing for depreciation charges based on 20 per cent of operating revenues)	0.03	
Dividends based on 6 per cent on $7,200,000 common stock	0.18	
*Deficit (after providing for 6 per cent dividend on common stock)	0.15	

*Exclusive of interest on working capital, provision for extraordinary contingencies or amortization of investment, assuming that depreciation would be taken care of inadequately on the basis of 20 per cent of operating revenues, equivalent to an average composite life of twenty years for the entire physical property.

RECENT DEVELOPMENTS IN ELECTRIC RAILWAY OPERATION

BY J. L. DAVIS, WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

It is the object of this paper to discuss broad lines of engineering by which much greater economies may be effected than simply by the reduction of a few pounds in the weight of cars. The company with which the writer is

connected offers two advanced means by which economies may be secured. They are:

First—The operation of two multiple-unit cars, instead of the familiar motor car and trailer, to reduce the weight and cost of operation of all-day heavy motor cars and to lessen the expense of platform and tripper charges for the rush-hour loads.

Second—The use of field control on the motor in congested cities and on high-speed interurban cars to effect the greatest economy in power consumption and flexibility of operation.

TRAINS VERSUS TRAILERS

Taking up first the question of two multiple-unit cars, trail car operation labors under the following disadvantages: The heavy four-motor motor-car equipments which are required are very uneconomical in power consumption in all-day operation; the motor equipment is abused during trailer operation; the use of heavy all-day cars with concentrated dead-weight motor loads causes track depreciation; any slow-down of schedules during the rush hours requires more cars to handle the load; trail cars without motive power require non-revenue cars for shifting in carhouses and to assembling points; jerky acceleration and braking are uncomfortable to passengers.

For multiple-unit operation the "HL" system of control, when mounted on both motor car and trailer, enables both cars to be operated as a single unit from any controller. The many advantages of this type, as stated in the following paragraphs, overweigh greatly a somewhat higher cost of equipment.

First—Two-motor equipments may be used on small motor cars with two smaller motors on large trail cars. This results in a great economy, as the light motor cars may be run during the long non-rush-hour periods.

Second—The distribution of the motors results in less abuse.

Third—Heavy cars are not pounding the track all day, and concentrated dead-weight loads are better distributed over the track.

Fourth—Schedules are not slowed down, as additional motor capacity is added with increased train weight, so that fewer cars are needed in the rush hours.

Fifth—The trail cars are independent motive units. Hence they can be shifted around in carhouses and any number linked together for shifting to distributing points. without the use of non-revenue motor cars.

Sixth—The combined acceleration can be made smooth.

Seventh—Large rush-hour cars with great loading capacity may be designed with a minimum weight per passenger and with a complete regard for loading and unloading facilities. The motor capacity may be made lighter, as it is needed for only a few hours in the morning and evening. The "HL" equipment is placed under the car so that the platform size and weight can be reduced materially.

Eighth—Since all circuit breakers and control devices of the "HL" control are placed under the car, it is impossible for a controller blowout to stampede the passengers. The same demand of the claim department which leads to the reduction of accidents by the adoption of low steps, folding steps and closed platform doors will eventually lead to the use of apparatus for eliminating every possibility of danger from a blowing circuit breaker or a controller explosion.

The "HL" unit switch control is made up of eight single switches mounted in a frame. The switches are alike and easily accessible and are pneumatically operated. The contact for carrying current is under 100 lb. pressure from the air cylinders, and, in opening, a 100-lb. spring gives a quick-break action to the jaws. The current-carrying capacity, reliability and low maintenance of this controller are due to the very high pressures obtained at the current-carrying contacts. The pressure on the contact is ten times as great as in an ordinary drum controller. Along with this there is a very powerful magnetic blowout for each switch and a simple circuit-breaker which cannot get out of adjustment. In comparison with two drum controllers for single car operation the "HL" control weighs about the same, taking into consideration the switch group under the car and one small master controller at each end of the car. The first cost is very little more and the maintenance less.

One of the former difficulties experienced with two-car operation in city streets has been inadequate coupling devices. This trouble has been practically solved by several combination solid-head couplers now on the market.

MOTOR EQUIPMENTS

Just as with the proper selection of the car unit to give a high all-day efficiency, so the motor equipment should be carefully selected for the service. If a reduction in motor equipment weight is injudiciously applied it may easily cause an increase of energy consumption and maintenance costs instead of a decrease. The easiest way for the designer to make a large reduction in motor weight for a given horse-power rating is to increase the speed of the motor. It will be shown that such a high-speed motor will generally consume more power than is saved in weight reduction.

In large cities particularly the operation of the car mainly consists of accelerations, which amount to about eight or nine to the mile. The number may be greatly increased by curves, teams on the track, traffic congestion, etc. To accelerate the car the motorman moves the controller so that an acceleration of not less than 1½ m.p.h.p.s. is produced. If the largest gear reduction is used in both instances a slow-speed motor will give the necessary tractive effort at a much smaller current input than will a high-speed light-weight motor. By the use of a slow-speed motor great economy in current consumption can be gained at each acceleration, and this will greatly outweigh the slight saving due to the small difference in motor weight.

As a concrete example take a car body equipped with two different double motor equipments of the same horse-power capacity. Car A is equipped with two slow-speed, 45-hp motors of 490 r.p.m. each, and will weigh 21 tons. Car B will have the same car body equipped with two light-weight 45-hp motors, each of 720 r.p.m., and will weigh 20½ tons, or be lighter by ½ ton in the motor equipment. This is a difference only of 5 per cent in total weight. Car A will require 73 amp per motor to give the usual acceleration of 1½ m.p.h.p.s., and car B with the lighter motor will require 97 amp to give the same acceleration. It is thus seen that though car B is 5 per cent lighter it takes 33 per cent more current for starting. Energy consumption tests will show that it will take about ⅓ kw-hour per car mile more to operate the lighter car B in the usual heavy city service. With the busbar cost of energy at 1 cent per kw-hour and 30,000 miles run by each car per annum, it will cost at least $100 more per car per annum to operate car B with the lighter motor than to operate car A with the somewhat heavier and slow-speed motors. This discussion does not take into consideration the additional saving in maintenance which can be effected by the use of the sturdier mechanical construction permitted by the slow-speed design.

The lessening of the motor weight is only a small factor in economizing energy. Even if the speeds of the motors are the same the greatest reduction in weight of the foregoing two-motor equipments made by sacrificing entirely sturdiness of design cannot amount to over 400 lb. per car, or 1 per cent of the total weight. Using published figures, at 5 cents per lb. the saving in power and track maintenance will not amount to over $20 per annum—a difference which may be more than wiped out if the weight of the motor parts has been pared down to the danger point. It must also be noted that the slower speed equipment with high accelerating power is much less subject to the abuse of the motorman than the higher speed equipment with

lower accelerating power. When a selection of new equipments is made energy consumption should be studied first and weight next. In general, the slowest speed equipment which can make the schedules with a margin is the one which should be selected.

FIELD CONTROL

Field control on the motors is particularly advantageous in saving current where many stops are made in congested districts, requiring a slow-speed motor to effect economy, and where high speed can be furnished for outlying districts. Such conditions obtain on all large city systems and upon the usual interurban roads which pass through towns and cities. The motors of such interurban cars usually have high-speed gear ratios, and thus consume a great deal of current in city operation and overheat more in this service than on outside runs. Again, interchangeability of equipment requires that the same cars should be used for local and express interurban schedules. Usually the gear ratio is selected for express runs, thus making cars very uneconomical and slow in schedule when used on local runs. Field control, which gives two different high-speed notches on the controller, permits the selection of a low-speed gear ratio for the local cars, and the same cars can be used for express schedules by running on the highest speed notch.

Field control is effected by dividing the motor field into two parts. These two parts are put in series to give a strong field and low current consumption in starting. To obtain the highest speed one of these parts is cut out of circuit entirely. This field control is permitted by the commutating-pole construction. It is a familiar method of operating thousands of motors in industrial applications.

Exhaustive tests on a two-motor field-control equipment in congested city service showed a saving of 12½ per cent in power consumption, or a saving of $75 to $100 per car per annum over a similar equipment without field control. The familiar drum type controller may be also adapted with slow-speed notch, which is particularly effective in congested streets when following teams, etc., and with a high-speed notch to give ample speed in outlying and less congested districts.

A striking example of field control is given by the 4000-hp Pennsylvania locomotives, which in one year's operation with 175,000 train movements had a total of only 23 minutes of delay chargeable to control and motor equipments. This unparalleled record stamps the thorough reliability of this method of control. Instead of two running notches the Pennsylvania locomotives have eight. The loss during acceleration is only 55 per cent of what it would be without field control.

POSSIBILITY IN REDUCTION OF MOTOR WEIGHTS

As noted before, the speed of the motor equipment at full load should be carefully selected for the service. In city service, with the usual schedules, the motor speed should not be over 500 r.p.m. when the stops are more than six to the mile and schedules of about 8 m.p.h. are maintained with 500 volts average on the trolley; 575 r.p.m. fits in well for schedules of 10 m.p.h. and stops of from four to six to the mile, while speeds as high as 700 r.p.m. are suitable for high-speed interurban service.

With the proper speed selected there are two ways in which the motor equipment may be lightened somewhat, as has been pointed out by the equipment committee of the American Electric Railway Engineering Association. The first is the extensive use of motor insulation of higher heat-resisting qualities, such as mica and asbestos properly applied. This enables the motor to be operated at higher temperatures, and a lighter motor may be selected for the work. The second is the use of some external ventilation in warm weather. It seems to be a matter of indifference whether the circulation of outside air is gained by means of ventilated covers on the motor, which allow the heat to be discharged from the interior of the motor even when standing, or by means of a vacuum fan mounted on the armature shaft, which draws air into the motor, but is not very effective when the stops are many, as in city service, and when it is needed most, and not at all effective when the car is standing still. As far as dirt in the motor is concerned, there is little difference whether this dirt is sucked in or drifts in. The operation of motors without covers is a familiar practice in thousands of instances and is already one way of using smaller and lighter motors which has been applied from the earliest days of the art.

It must be remembered, however, that, although such methods permit the use of smaller motors electrically, they do not enable the motor to do increased work mechanically. The mechanical design of such small motors should be sturdier than those of the more familiar type and of like rating.

WORKMEN'S COMPENSATION LAW

BY C. H. CROWNHART, CHAIRMAN INDUSTRIAL COMMISSION OF WISCONSIN

The act grew out of conditions with which you are somewhat familiar. The conditions were harsh and unjust to the workman who was injured in his employment and, moreover, very wasteful.

The ancient rule applied to the torts of a servant was *respondeat superior*—the master is liable for the acts of his servant. This rule prevails unto this day so far as the torts of the servant may affect a stranger. But if one servant injures a fellow servant the courts have made an exception to the rule, and this exception is called the "fellow-servant doctrine." This doctrine was not declared by any Legislature, but by the courts, and it was declared by the courts, not in analogy to any rule, nor as following any rule or precedent, but as declaring a public policy. The facts out of which the rule grew were these: A railroad fireman in South Carolina in 1838 was injured by the negligence of the engineer. The fireman brought suit against the railroad company. The court held as a matter of public policy that it was better to deny recovery, and gave as a reason that the servant had a better opportunity to observe and guard against the conduct of his fellow servant than had the master. There was some reason in the rule, as applied to the facts. But by definition the rule finally came to include practically all employees of the same master; so it was held that a telegrapher who sent an engine into the ditch 200 miles away was the fellow servant of the engineer. No matter that these men had never met, did no work in common, and were not in fact fellow servants, in law they were fellow servants. So the superintendent, who controlled and directed men in the employ of the master, was held to be a fellow servant of the men who were under his control. The rule became a rule of property, and the guarantee of the Constitution that every person is entitled to a certain remedy in the law for wrong or injury to his person was defeated by the highest courts in the land. Our Supreme Court at first refused to adopt the rule. Later it was adopted by a two-to-one decision, Justice Paine dissenting. Still later, the court regretted the rule but applied the property rule of *stare decises* to justify it.

THE RULE OF ASSUMPTION OF RISK

The rule of assumption of risk was first declared by the courts as a rule of public policy. It is more ancient than the fellow servant rule and has less to commend it to the conscience of the court. It is in effect the denial of recovery for injury to the servant where the injury came from a condition known to him before the accident. The rule grants the negligence of the master, but assumes that the servant, knowing of the negligence of the master, is at liberty to quit his service. If he continues in the service he assumes all dangers of the service which were known to him. It was not Jeffreys who announced this public

policy. The rule, as applied to the simple conditions existing when it was declared, was not so brutal as when applied in other days, to other conditions, by other courts. The courts early adopted the rule of *stare decises,* which means that a bad rule may be sustained and followed because it has been so decided.

Along with these rules were developed other rules—rules of evidence, rules relating to verdicts of juries, rules relating to contributory negligence, rules to legally defeat recovery in every case where the courts so desired. I have no desire to criticise the courts. They are quite human. Courts sit far removed from industrial hazard. They have little appreciated the changing conditions and they have not realized the results of their decisions until too late. It is only fair to say that many judges, and some courts, desire to get away from these conditions for which they individually are not to blame.

LIABILITY INSURANCE

Employers, being liable to possible large claims from personal injury, readily accepted the principle of liability insurance for their protection. This insurance was not to compensate the workman for injury, but it was to protect the employer against compensation to his workmen. Thus the employer paid the liability company to see that his injured workmen got nothing, but, if by some evil luck the workman should recover, then the liability company paid the loss. The liability company adopted the methods of the railroad companies to defeat the employee. The claim agent, signed statements, biased doctors, sharp practices, delay, appeals, excessive expense—all made it exceedingly difficult for a man with a good case to recover. With this bad system grew up the system of the ambulance chaser—not unlike that of the claim agent. Large contingent fees made the system possible and sometimes lucrative to the personal-injury lawyer. These methods are wasteful to the last degree. They defeat justice and serve no good purpose.

WISCONSIN LEGISLATURE OF 1909

All European countries excepting Turkey and Switzerland have compensation acts. All the English colonies, including each province of Canada and Australia, have compensation acts. The German act is thirty years old.

Such were the conditions when the Wisconsin Legislature of 1909 met. It created a committee to study conditions and to report a compensation act. The committee reported a bill to the 1911 Legislature which was passed substantially as reported.

The act abolished the defence of assumption of risk and fellow servant. This part of the act took effect on Sept. 1, 1911. The act then provides an elective scheme of compensation. The compensation is based on the loss of wage by reason of injury to the workman received in the course of his employment. The question of fault or negligence is not material; the only defence is where the injury is the result of "wilful misconduct." The basis of compensation is loss of wage only, and in this respect is more favorable to the employer than the liability laws. Under the liability laws recovery is based on loss of wage, plus physical suffering, plus mental suffering. Under the compensation act there may be both physical and mental suffering without loss of wage. The compensation to be made is 65 per cent of the loss of wage within the limits of $375 minimum and $750 maximum annual wage. The payments are to be made weekly, no payment for the first week unless the injury disables the employee for over twenty-eight days. In case of death, payments are to be made to the dependents of the deceased. If there are no dependents no compensation is required beyond reasonable funeral expenses, not to exceed $100. Payment to the dependent is to be made weekly and in such sums as equal the employee's weekly wage. In no case shall the compensation exceed four times the employee's average annual wage within the minimum and maximum mentioned.

FIRST AID

In addition to the compensation prescribed the employer is required to furnish first aid, i.e., such medical and surgical treatment, medicine, medical and surgical supplies, crutches and apparatus as may be reasonably required to cure and relieve during the first ninety days. The old line liability companies claim there is no limit of cost for first aid. The Industrial Commission does not so construe the law. Such as may be reasonably required is both a wise and effective limitation.

COMPARISON OF ACT WITH LIABILITY LAWS

The employer has a limited liability of $3,000 under the act, instead of $10,000 for death and unlimited liability for injury without death, under the old law; the employer may pay weekly the loss of wage and thus distribute the loss over a long time, thereby saving the shock to business from large judgments payable at once; in many cases there may be painful injury where there is no loss of wage. Under the compensation act there would be no recovery, but under the liability act there would be recovery; the employer has a more limited liability in case of death as to dependents under the act than under the liability laws. All humane employers feel that their faithful employees should have some consideration at time of personal injury, and they frequently render assistance, notwithstanding they have liability insurance; employers under the liability laws are compelled to spend much time with employees in court as witnesses in personal injury cases, which interferes with business and occasions hard feeling between employer and employees; employers are frequently called upon to pay, notwithstanding liability insurance, under the old law, because of the limited liability under the policy, or because of the many conditions and restrictions in the policy.

On the other hand, under the compensation act, insurance rates with old line companies are higher; compensation must be paid in every case except where there is wilful misconduct on the part of the employee; there may be cases where employees will attempt to defraud employers by feigning injury; the employer may be at a disadvantage in the field of competition.

INDUSTRIAL COMPETITION

The more important work of the commission is to assist in every way the work of accident prevention. The compensation act is an incentive to accident preventive measures on the part of the employers. The two go, properly, hand in hand.

The act is elective, and employers may go under it only from choice. Many employers have so elected, and where the employer has elected the employees have accepted the act without exception so far as we have found.

The commission does not urge anyone to accept the act. We will aid to a correct understanding of the principles involved, and we believe that the law will appeal to humane and up-to-date employers.

LIABILITY RATES

Liability rates have been placed very high under the act by the old line companies, and, we believe, too high. Certainly the companies based their rates on a general misconception of the meaning of the law. The way to solve the question of liability insurance will probably be found in the German system of mutual companies.

In 1908 employers in Wisconsin paid premiums to liability companies in the sum of $600,000. This amount, it has been figured, would more than have paid every injured employee compensation according to the schedule of the compensation act. Of this $600,000 probably not more than $150,000 actually reached the men injured. How can business men justify such a wasteful system?

RELATION OF PUBLIC UTILITIES TO THE ACT

We may not be remiss in calling your attention to the fact that the compensation scheme treats accidents as unavoidable hazards of the occupation; that the payment of compensation should be made by the industry; that even-

tually the cost of compensation will go into the cost of the product and be paid by the consuming public. That such distribution is more equitable than the plan of making the weakest member of society stand all the loss must be apparent.

The public utilities are already passing the cost of liability for personal injuries on to the consumer. Even now the public is required to pay the loss occasioned by your negligence as well as your misfortune.

No doubt the Legislature may make the law compulsory as to the public utilities.

It is our belief that the compensation act is here to stay. If so, the next Legislature may well withdraw the defense of contributory negligence. When that is done no employer can afford to stay out from under the act.

The spirit of the law intends that the compensation shall be carried to the employee without expense to either party, and that the payments shall be made promptly.

We have allowed the parties to make their own settlements, which are reported to the commission. If they seem fair they are confirmed. If the parties are unable to agree we will take the matter up promptly on the ground and adjust it. Neither party will need an attorney except in very grave cases. So far we have experienced little difficulty in administering the law. Employers seem to understand the law and apply it fairly.

Compromises may be made to save waste, and the commission favors them. If a faithful employee should be injured so as to be unable for a time to run his machine, and the employer should with his consent put him on a job at which he could work despite his injury, at full wage in lieu of compensation, both the employee and the employer are benefited. A compromise of this kind meets the purpose of the law fully.

The employer should aim to save waste, and, above all, he should study accident prevention. The question is not so much how to pay for accidents but how to prevent them.

CHRISTMAS OPENING OF FORT SMITH CLUBROOMS

Christmas night of 1911 saw the auspicious opening of the handsome and cozy clubrooms which the Fort Smith (Ark.) Light & Traction Company has provided for its employees. Over 200 of the company's force were present at the housewarming, and commendatory speeches were made by notable men of the city. The employees and guests were welcomed by J. W. Gillette, treasurer and general manager of the company. He also read a letter from Arthur S. Huey, president of the Fort Smith company and vice-president H. M. Byllesby & Company, Chicago, in which the men were thanked for their part in making the Fort Smith property one of the most popular public utility corporations in the United States.

Mayor Fagan Bourland expressed his pleased astonishment at the splendid clubroom equipment. He was proud of the company, which was always doing so much to improve its service. As for the men, they were so efficient that several had been placed on the police force and more would be taken if the railway could spare them.

Following the Mayor, Judge W. A. Falconer spoke on welfare relations and praised the enlightened policy of the Fort Smith company. In concluding, he turned to Mr. Gillette and said: "Your men know you as being of solid gold, a stem-winder and full-jeweled. They have asked me to present to you on their behalf this beautiful gold watch as a slight token of the esteem in which you are held by them."

In a happily worded acknowledgment of this gift Mr. Gillette assured the donors that as the watch ticked off the days, months and years so would his heart beat in brotherly feeling for them.

Judge Joseph M. Hill then read a congratulatory letter addressed to Mr. Gillette by H. M. Byllesby, president H. M. Byllesby & Company. Judge Hill said that corporations were fast adopting the policy of taking a personal interest in their employees. He also said: "The fact that the company has paid out so little for damages is because the employees tell the truth. Their statements of accidents are truthful and their word is believed by their employer.

Reception Room—Fort Smith

When they go upon the witness stand their employers' statements are believed by the juries. No higher compliment could be paid you."

Mr. Gillette stated that H. M. Byllesby & Company were now operating 114 public utilities in the United States, but that the record of the Fort Smith Light & Traction Company stood close to the top. During October, 1911, it had carried 563,000 passengers without a single accident, due chiefly to the loyalty and efficiency of the platform men. Mr. Gillette then announced the appointment of a committee to effect an organization of the employees.

In addition to the gift for their general manager, the men also presented a gold watch to Superintendent

Billiard Room—Fort Smith

McCarty, another to John Sibley, traffic manager; a gold watch and charm to T. G. Kelley, inspector, and a kit of automobile tools and a pair of diamond cuff buttons to Andrew Patterson, superintendent of the electrical department.

During the year 1911 the Public Service Commission of the Second District of New York authorized securities for the corporations under its jurisdiction amounting to $162,581,718.52, divided among the classes of corporations as follows: Steam railroads to the amount of $119,718,937; electric railways to the amount of $24,323,500; gas and electric corporations to the amount of $17,952,581; telephone corporations to the amount of $581,700. The total amount of securities authorized during the commission's existence of more than four years is $566,469,507.86.

Proceedings at the Dayton Convention

The Annual Meeting Was Largely Attended—Officers for the Ensuing Year Were Elected—Among the Subjects Discussed Were Wood Preservation, Light-Weight Motors and Hospital Service

The annual convention of the Central Electric Railway Association was held at the Phillips House, Dayton, on Jan. 18. About 100 delegates were in attendance and the meeting was an enthusiastic one. E. B. Peck, president of the association, called the convention to order at about ten o'clock and announced that the first business would be a discussion of the conclusions of the committee on standards of the association in regard to anti-climbers. This report was presented at the last meeting of the association and appeared in the Electric Railway Journal for Nov. 25, 1911. A number of delegates spoke on the subject, but no general conclusions were reached.

President Peck then appointed a committee to consider the suggestions made in the paper on lightning protection, presented by E. J. Burdick at the Louisville meeting on Nov. 23, 1911, and reported in the Electric Railway Journal for Nov. 25, 1911. The committee consisted of George Whysall, Edward Heiden and Thomas H. Henkle. Following this action, twelve new associate members were elected.

Charles L. Henry, Indianapolis & Cincinnati Traction Company, then read a series of resolutions expressing the regret of the association on the death of the late Hugh J. McGowan, of Indianapolis. These resolutions were passed by a rising vote. The association also voted to instruct the secretary to send a telegram of sympathy and encouragement to George S. Davis, editor *Electric Traction Weekly*, who is critically ill at Cleveland.

WOOD PRESERVATION

Frank Smith, superintendent of way and structures Indianapolis, Columbus & Southern Traction Company, then read a paper on wood preservation. This paper is published in abstract elsewhere in this issue. In connection with the paper, Mr. Smith showed sections of treated ties which had been in service.

Gaylord Thompson, chief engineer Ohio Electric Railway Company, then presented the following written discussion:

"About two years ago I had occasion to investigate the question of tie preservatives for our company. A statement of the case as it then appeared to us and the results that have followed may be of interest to this association.

"The main line mileage of the Ohio Electric Railway aggregates about 620 miles. Estimating 2700 ties to the mile, we have in our tracks 1,674,000 ties. At an average life of nine years we would therefore require 186,000 ties annually for renewals. Owing to the large number of new ties placed in our track during the past few years, we would probably not reach this average consumption until about the year 1915. It was considered, however, that we should figure on furnishing 150,000 ties a year for the following five years and estimates of cost were made on that assumption.

"To furnish that number of ties would require a plant capacity of 500 ties a day, working 300 days a year. Such a plant would cost about $15,000 for the vacuum process of treatment, according to proposals received from manufacturers, although I understand the treating plant at Columbus, Ind., cost only $7,000.

"All the timber was to be of red oak, black oak, beech, elm or gum, selected because of their coarse grain and open pores and consequent susceptibility to saturation by the chemical used, and as they were otherwise short-lived they would be cheaper than timber in the white oak class. All tie timber would have to be full-sized, perfectly sound and should have six to eight months' seasoning before treatment. It would have required a space 400 ft. x 400 ft., preferably under cover, to stack and store the number of ties required, and to keep the plant working continuously.

"Under our conditions, requiring so many ties, we could not hope to get the green timber in our own territory and quotations from various dealers at that time averaged 50 cents per tie delivered at Cincinnati. We figured that the straight creosoting process with full saturation would cost 50 cents, that extra handling of ties, freight to destination and interest and depreciation on plant would aggregate $1.15 per tie, and that a tie so treated would last from fourteen to sixteen years. This first cost could be brought to 95 cents per tie by using cheaper chemicals, but the life of the tie would be correspondingly reduced although the ultimate cost would be increased.

"We were therefore confronted with these figures:

"*Treated Ties*—Cost of Plant—$15,000 plus cost of 150,000 ties at $1.15 = $172,500 a year for nine years, and thereafter 111,600 ties at $1.15 = $128,340 a year.

"*White Oak Ties*—Cost of 150,000 ties at 70 cents = $105,000 a year for nine years, and 186,000 ties at 85 cents $158,100 a year thereafter (the 85 cents allows for 10 cents per tie to install and 5 cents per tie increase in price for that period), so that, assuming the treated ties good for sixteen years and an oak tie good for nine years, the account would stand: Expenditures for treated ties for sixteen years, $2,465,880, and for white oak ties for the same period, $2,051,700. This is an advantage of $414,180 for the white oak ties, besides two years more life on 186,000 ties. It was therefore quite evident that the cost of treated ties would have to be greatly reduced or the cost of white oak ties greatly increased before the white oak tie could be supplanted in favor. Our conclusion was that at the prevailing price of white oak ties it would not pay to establish a treating plant of the character stated.

"Since that question was disposed of we have purchased 100,000 ties treated with C-A-Wood-Preserver at an average cost of 81 cents per tie and guaranteed for fifteen years; that is, at a cost of about 5.4 cents a year per tie. Under this contract our company would be entitled to a rebate of 5.4 cents a year for each year that each tie fails to fulfil the term of the guarantee, and would pay that amount per tie per annum for every tie that exceeded the term of the guarantee. A certain percentage of the cost price is reserved by the railway for its protection. This reserve does not become payable until it is earned as provided for in the contract.

"The method of treatment is substantially as follows: The tie is immersed in an open tank containing C-A-Wood-Preserver at a temperature of 250 deg. Fahr. for eight to ten minutes and then transferred to a cold bath of the same chemical and kept in for a sufficient length of time to absorb one-third of a gallon of the chemical to the tie (average size, 6 in. x 8 in. x 8 ft.), when the tie is removed and is ready for service in a few hours' time. A record of the disposition of each tie is kept, referring its location to the pole number and the number of the tie from the pole; thus, tie No. 35, pole No. 1582, means the thirty-fifth tie from pole No. 1582. The section foreman reports each day's work on a blank prepared for the purpose and a copy is made in the permanent office record.

"The accounting is simple and no trouble has thus far been experienced, but, like all operations that necessitate accuracy, constant care must be taken to get the records; otherwise serious complications may ensue, and this liability is one of the details that must be understood.

"The success of this treatment absolutely depends upon the fidelity with which the successive steps are taken and the specifications followed. It was my thought that this fidelity would be best insured by making the financial profit to the contractor depend upon that all-important detail."

In addition to the paper, Mr. Smith said that the cost of treating 15,000 ties during 1910 was 28 cents each, that is, one cent lower than in 1909. A general discussion followed on the data presented by Mr. Smith.

C. P. Winslow, Forest Service Department, United States Department of Agriculture, who read a paper on the preservation of timber at the June meeting of the Central Electric Railway Association, then discussed the advantages of the establishment of a co-operative preservation plant by the members of the Central Electric Railway Association. When questioned regarding zinc chloride treatment, Mr. Winslow said that to obtain the best results with this treatment, the tie should be air-seasoned after the treatment so as to prevent any corrosive action of the chemical on the spikes. This corrosion had been very severe on the Chicago surface lines. In fact, the spikes were practically half eaten away and the engineers had decided not to continue the treatment of ties with zinc chloride. The corrosion in Chicago might, however, have been due partly to electrolytic action.

The president then introduced John F. Ohmer, Dayton, who described his turnstile fare collection device which is now in operation on a car in Dayton. Mr. Ohmer extended a cordial invitation to the delegates to see this device in service.

LIGHT-WEIGHT MOTORS

W. E. Sargent, of the Cincinnati office of the General Electric Company, then read a paper on light-weight motors. This paper is published in abstract in this issue.

In the discussion, F. D. Carpenter, Lima, asked Mr. Sargent whether there was any possibility of dust getting into motors of the type described. Mr. Sargent replied that the heavy draft supplied by the ventilators blew out the dust and kept the parts cleaner than in the old type of inclosed motor. He said that this statement was based on tests conducted of a motor in service for eight months. The same conditions applied to snow. The motor was kept free from it.

Miles Lambert, Westinghouse Electric & Manufacturing Company, then spoke of the effect of high armature speeds on motor losses and the reduction of the weight of the motors.

HOSPITAL SERVICE

H. M. Bascom, chief surgeon Illinois Traction System, Peoria, followed with a paper on the benefits of the Illinois Traction System hospital association. This paper is published elsewhere in this issue. Continuing, Dr. Bascom said that of 3000 ex-employees of the company, some 2000 belonged to the death benefit department of the association. The average monthly premium for this department is 50 cents.

F. D. Carpenter, Lima, and C. K. Jeffries, Indianapolis, briefly discussed Dr. Bascom's paper. In this connection, President Peck said that one of the companies forming the Illinois Traction System was now a member of the Central Electric Railway Association and as soon as physical connection would be made between the interurban lines in Illinois and those in Indiana, as is now planned, the entire Illinois Traction System will join the Central Electric Railway Association.

OTHER PAPERS

Alexander Shane, general manager Indianapolis, Columbus & Southern Traction Company, then read a paper on "Duty, Obedience and Responsibility." This paper is published in abstract elsewhere in this issue. There was no discussion.

President Peck then spoke of the desire of the American Electric Railway Association and of the Central Electric Railway Association to co-operate in every way, and the benefits which would follow such action. He also referred to the fact that the standardization committee of the Central Electric Railway Association had met in Dayton the previous day with the president of the American Electric Railway Engineering Association to discuss the general subject of standardization. The results of this meeting, President Peck said, and the report of the standardization committee would be presented at the next meeting of the association.

MISCELLANEOUS BUSINESS

A. L. Neereamer, secretary and treasurer of the Central Electric Railway Association, then read his report, which appears elsewhere in this issue. President Peck then read his annual address, which is also published in this issue. At the conclusion of his address, President Peck announced that the next meeting of the association will be held in Indianapolis, March 28.

ELECTION OF OFFICERS

The following officers were then elected: President, W. S. Whitney, general passenger agent Ohio Electric Railway Company; first vice-president, A. W. Brady, president Indiana Union Traction Company; second vice-president, E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway Company; secretary and treasurer, A. L. Neereamer.

The executive committee will be as follows: H. A. Nicholl, general manager Indiana Union Traction Company; C. N. Wilcoxon, general manager Chicago, Lake Shore & South Bend Railway Company; J. A. Crall, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company; E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company; C. L. Henry, president and general manager Indianapolis & Cincinnati Traction Company; George Whysall, general manager Columbus, Marion & Bucyrus Railway; R. A. Crume, general manager Dayton & Troy Electric Railway Company; F. W. Coen, general manager Lake Shore Electric Railway Company; Walter Shearer, president Central Electric Accountants' Association; S. D. Hutchins, Westinghouse Traction & Brake Company; F. W. Brown, general freight and passenger agent Michigan United Railways Company; John F. Keys, general passenger agent Detroit United Railway Company; M. J. Insull, general manager Louisville & Northern Railway & Lighting Company; A. A. Anderson, general manager Springfield Consolidated Railway Company.

The District Court of Appeals of the Second Appellate District, in the case of the Los Angeles-Pacific Company against the Board of Public Works of Los Angeles, has rendered a decision reversing the judgment of the Superior Court of Los Angeles County. The Appellate Court holds that the Los Angeles-Pacific Company can be compelled to pay the assessment levied by the city on the company's property for the purpose of opening and widening West Sixteenth Street from Figuera Street to Pacific Avenue. It holds further that the rights of way of railroads, whether owned in fee or otherwise, should be assessed for the cost of widening streets in proportion to the benefits inuring to such property, as a result of the improvement made. The company maintained that the property, including franchise on Sixteenth Street, could not be assessed for the proposed street improvement and refused to pay the assessment amounting to about $4,000.

The record of passenger train performances on the steam railroads of New York State for November shows that during the month the number of trains run was 62,075. Of the number of trains run, 82 per cent were on time at the division terminal. The average delay for each late train was 25.2 min. and for each train run was 4.4 min.

Committees of the American and T. & T. Associations

A Full List of the Members of the Committees, as Made Public by Presidents McCarter and Shannahan, Is Published

Thomas N. McCarter, president of the American Electric Railway Association, has announced the members of the committees of that association for the current year. A full list of these committees is published below. One of the committees which have been increased very largely in number of members is the committee on taxation matters, which now has a member from each state and three from Canada. This is in accordance with the recommendation of the report of the committee on taxation presented at the 1911 convention. The total number of committee members of the American Electric Railway Association and its allied associations is about 350, and the number of committees about fifty.

COMMITTEE ON SUBJECTS

C. Loomis Allen (chairman), Syracuse, N. Y.
William A. House, Baltimore, Md.
Joseph D. Mortimer, Milwaukee, Wis.
Calvert Townley, New York, N. Y.
E. C. Foster, Manchester, N. H.
P. H. Gadsden, Charleston, S. C.
P. S. Young, Newark, N. J.
E. O. Ackerman, Columbus, Ohio.
H. K. Bennett, Fitchburg, Mass.
J. N. Shannahan, New York, N. Y.

COMMITTEE ON ACTIVE MEMBERSHIP

C. Loomis Allen (chairman), Syracuse, N. Y.
C. H. Harvey, Knoxville, Tenn.
E. B. Peck, Indianapolis, Ind.
J. H. Pardee, New York, N. Y.
G. H. Clifford, Fort Worth, Tex.
John S. Bleecker, Columbus, Ga.
H. T. Edgar, Seattle, Wash.
S. P. Russell, Haverhill, Mass.
F. D. Shaffer, Oil City, Pa.
James Anderson, Windsor, Ont.
E. C. Faber, Wheaton, Ill.
Joseph S. Wells, Salt Lake City, Utah.

COMMITTEE ON ASSOCIATE MEMBERSHIP

James F. Shaw (chairman), New York, N. Y.
Gen. George H. Harries, Louisville, Ky.
James H. McGraw, New York, N. Y.
W. L. Conwell, New York, N. Y.
William A. House, Baltimore, Md.
T. H. Tutwiler, Memphis, Tenn.
Charles N. Black, San Francisco, Cal.
L. H. Bean, Tacoma, Wash.
H. E. Huntington, Los Angeles, Cal.
R. E. Danforth, Newark, N. J.
M. C. Bush, Boston, Mass.
L. S. Storrs, New Haven, Conn.
H. J. Davies, Cleveland, Ohio.
R. I. Todd, Indianapolis, Ind.
J. C. Hutchins, Detroit, Mich.
C. N. Duffy, Milwaukee, Wis.
Frank Hedley, New York, N. Y.
J. F. Calderwood, Brooklyn, N. Y.
Robert McCulloch, St. Louis, Mo.
D. A. Hegarty, New Orleans, La.
A. H. Ford, Birmingham, Ala.
E. F. Schneider, Cleveland, Ohio.
C. E. A. Carr, Quebec, Que.
R. S. Goff, Boston, Mass.
F. E. Smith, Chicago, Ill.
C. G. Goodrich, Minneapolis, Minn.
E. T. Moore, Dallas, Tex.
W. H. Glenn, Atlanta, Ga.
Clarence P. King, Washington, D. C.
P. S. Young, Newark, N. J.
E. O. Ackerman, Columbus, Ohio.
H. K. Bennett, Fitchburg, Mass.
J. N. Shannahan, New York, N. Y.

COMMITTEE ON INSURANCE

H. J. Davies (chairman), Cleveland, Ohio.
A. H. Ford, Birmingham, Ala.
S. L. Tone, Pittsburgh, Pa.
F. A. Healy, Cincinnati, Ohio.
A. W. McLimont, Jackson, Mich.

COMMITTEE ON EDUCATION

Prof. H. H. Norris (chairman), Ithaca, N. Y.
Prof. A. S. Richey, Worcester, Mass.
Prof. D. C. Jackson, Boston, Mass.
R. S. Goff, Boston, Mass.
J. F. Calderwood, Brooklyn, N. Y.

COMMITTEE ON WELFARE OF EMPLOYEES

J. H. Burleigh (chairman), Newark, N. J.
T. S. Williams, Brooklyn, N. Y.
Gen. George H. Harries, Louisville, Ky.
D. F. Sherman, Providence, R. I.
James D. Callery, Pittsburgh, Pa.
Dana Stevens, Cincinnati, Ohio.
H. T. Edgar, Seattle, Wash.
C. S. Krick, New York, N. Y.

COMMITTEE ON COMPENSATION FOR CARRYING UNITED STATES MAIL

T. H. Tutwiler (chairman), Memphis, Tenn.
C. E. Titzel, Lancaster, Pa.
H. A. Nicholl, Anderson, Ind.
C. H. Hile, Boston, Mass.
A. R. Piper, Brooklyn, N. Y.
J. McMillan, Los Angeles, Cal.
J. K. Choate, Hartwick, N. Y.
E. C. Spring, Upper Darby, Pa.
George B. Wheeler, Eau Claire, Wis.

COMMITTEE ON PUBLIC RELATIONS

Arthur W. Brady (chairman), Anderson, Ind.
Patrick Calhoun, San Francisco, Cal.
James H. McGraw, New York, N. Y.
George H. Davis, New Orleans, La.
P. S. Arkwright, Atlanta, Ga.
C. C. Smith, Milwaukee, Wis.
H. E. Chubbuck, Springfield, Ill.
W. G. McAdoo, New York, N. Y.
O. T. Crosby, Wilmington, Del.
G. E. Tripp, New York, N. Y.
W. G. Ross, Montreal, Que.
J. F. Strickland, Dallas, Tex.
John A. Beeler, Denver, Col.
Albion E. Lang, Toledo, Ohio.
Williston Fish, Chicago, Ill.
R. L. Rand, Anniston, Ala.
J. M. Hewitt, Marianna, Ark.
James Anderson, Windsor, Ont.
E. B. Peck, Indianapolis, Ind.
W. E. Robertson, Leadville, Col.
B. F. Eyer, Manhattan, Kan.
Robert S. Goff, Boston, Mass.
R. J. Irvine, Marshall, Mo.
Franklin Woodman, Haverhill, Mass.
H. R. Fehr, Easton, Pa.
Joe E. Carroll, Beaumont, Tex.

Joseph K. Choate, Hartwick, N. Y.
George B. Wheeler, Eau Claire, Wis.
Noel R. Gascho, Alva, Okla.

COMMITTEE ON FEDERAL RELATIONS

Gen. George H. Harries (chairman), Louisville, Ky.
Frank R. Ford, New York, N. Y.
C. S. Sergeant, Boston, Mass.
F. W. Brooks, Detroit, Mich.
L. S. Cass, Waterloo, Ia.
R. I. Todd, Indianapolis, Ind.
L. S. Storrs, New Haven, Conn.
Richard McCulloch, St. Louis, Mo.

COMMITTEE ON DETERMINING PROPER BASIS FOR RATES AND FARES

Frank R. Ford (chairman), New York, N. Y.
C. S. Sergeant, Boston, Mass.
C. N. Duffy, Milwaukee, Wis.
William J. Clark, New York, N. Y.
James F. Shaw, New York, N. Y.
E. C. Foster, Manchester, N. H.
H. G. Bradlee, Boston, Mass.
R. I. Todd, Indianapolis, Ind.

COMMITTEE ON TAXATION MATTERS

Alabama; J. H. Wilson, Mobile.
Arkansas; C. J. Griffith, Little Rock.
Arizona; F. E. Russell, Tucson.
California; John A. Britton, San Francisco.
Colorado; John A. Beeler, Denver.
Connecticut; L. S. Storrs, New Haven.
Delaware; O. T. Crosby, Wilmington.
District of Columbia; D. S. Carll, Washington.
Florida; Alba H. Warren, Pensacola.
Georgia; W. H. Glenn, Atlanta.
Illinois; L. C. Haynes, East St. Louis.
Indiana; R. I. Todd, Indianapolis.
Iowa; P. P. Crafts, Davenport.
Kansas; A. M. Patten, Topeka.
Kentucky; F. W. Bacon, Lexington.
Louisiana; D. A. Hegarty, New Orleans.
Maine; Howard Corning, Bangor.
Maryland; L. G. Turner, Baltimore.
Massachusetts; H. C. Page, Worcester.
Michigan; F. W. Brooks, Detroit.
Minnesota; W. J. Hield, Minneapolis.
Mississippi; A. B. Paterson, Meridian.
Missouri; A. H. Rogers, Webb City.
Montana; J. H. White, Helena.
Nebraska; W. A. Smith, Omaha.
New Hampshire; J. Brodie Smith, Manchester.
New Jersey; George H. Barker, Newark.
New Mexico; M. O. Chadburn, Albuquerque.
New York; E. S. Fassett, Albany.
North Carolina; H. W. Plummer, Asheville.
North Dakota; C. B. Brown, Fargo.
Ohio; Dana Stevens, Cincinnati.
Oklahoma; A. H. Classen, Oklahoma City.
Oregon; F. I. Fuller, Portland.
Pennsylvania; C. L. S. Tingley, Philadelphia (chairman).
Rhode Island; A. E. Potter, Providence.
South Carolina; P. H. Gadsden, Charleston.
South Dakota; F. M. Mills, Sioux Falls.
Tennessee; Percy Warner, Nashville.
Utah; J. S. Wells, Salt Lake City.
Texas; W. J. Jones, Austin.
Vermont; I. L. Meloon, New York.
Virginia; A. B. Guigon, Richmond.
Washington; Guy W. Talbot, Portland
West Virginia; G. O. Nagle, Wheeling.
Wisconsin; George B. Wheeler, Eau Claire.
Canada:
British Columbia; George Kidd, Vancouver.
New Brunswick; H. M. Hopper, St. John.
Nova Scotia; J. W. Crosby, Halifax.
Quebec; C. E. A. Carr, Quebec.

COMMITTEE TO CONSIDER RECOMMENDATIONS IN OUTGOING PRESIDENT'S ADDRESS

C. N. Duffy (chairman) Milwaukee.
Arthur W. Brady, Anderson, Ind.
Richard McCulloch, St. Louis, Mo.

COMMITTEE TO CONSIDER THE MATTER OF RELATIONS WITH SECTIONAL ASSOCIATIONS

C. L. Henry (chairman), Indianapolis, Ind.
R. P. Stevens, Allentown, Pa.
C. C. Peirce, Boston, Mass.
W. J. Harvie, Syracuse, N. Y.
H. L. Wilson, Boston, Mass.
H. V. Drown, Newark, N. J.
H. C. Page, Worcester, Mass.
Percy Warner, Nashville, Tenn.

COMMITTEES OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

John N. Shannahan, president of the American Electric Railway Transportation & Traffic Association, has made public the membership of the committees of that association for 1912. The names follow:

COMMITTEE ON SUBJECTS

E. C. Faber (chairman), Wheaton, Ill.
J. K. Punderford, New Haven, Conn.
L. H. Bean, Tacoma, Wash.

COMMITTEE ON CITY RULES

E. F. Peck (chairman), Indianapolis, Ind.
J. McMillan, Los Angeles, Cal.
George Kuemmerlein, Jr., Milwaukee, Wis.
W. A. Heindle, Wilmington, Del.
W. H. Glenn, Atlanta, Ga.
W. B. Rockwell, Pottsville, Pa.

COMMITTEE ON INTERURBAN RULES

C. F. Handshy (chairman), Springfield, Ill.
F. A. Boutelle, Tacoma, Wash.
W. H. Collins, Gloversville, N. Y.
Alexander Shane, Columbus, Ind.
J. J. Doyle, Baltimore, Md.
G. H. Clifford, Fort Worth, Tex.

COMMITTEE ON PASSENGER TRAFFIC

J. Stanley Moore (chairman), Syracuse, N. Y.
F. G. Buffe, Peoria, Ill.
J. E. Gibson, Kansas City, Mo.
Frank Caum, Scranton, Pa.
N. W. Bolen, Newark, N. J.
J. P. Potter, Oakland, Cal.

COMMITTEE ON EXPRESS AND FREIGHT TRAFFIC

H. E. Reynolds (chairman), Boston, Mass.
G. W. Quackenbush, Springfield, Ill.
F. W. Coen, Sandusky, Ohio.
A. R. Piper, Brooklyn, N. Y.
F. D. Norviel, Anderson, Ind.
J. C. Calisch, Buffalo, N. Y.

JOINT COMMITTEE (WITH ACCOUNTANTS) ON EXPRESS AND FREIGHT ACCOUNTING

(Representing Transportation & Traffic Association.)
J. K. Choate (chairman), Hartwick, N. Y.
G. H. Harris, Birmingham, Ala.
E. C. Spring, Upper Darby, Pa.

COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIME-TABLES

W. R. W. Griffin (chairman), East Liverpool, Ohio.
W. O. Wood, Long Island City, N. Y.
J. E. Duffy, Syracuse, N. Y.
R. E. Lee, Cincinnati, Ohio.
C. F. Hewitt, East St. Louis, Ill.
A. D. Schindler, San Francisco, Cal.
C. E. Morgan, Crawfordsville, Ind.

T. F. Grover, Indianapolis, Ind.

COMMITTEE ON FARES AND TRANSFERS

T. C. Cherry (chairman), Syracuse, N. Y.
F. T. Wood, New York, N. Y.
J. V. Sullivan, Chicago, Ill.
J. J. Dempsey, Brooklyn, N. Y.
J. J. Johnson, Oklahoma City, Okla.
E. C. Deal, Augusta, Ga.

COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES

R. E. Danforth (chairman), Newark, N. J.
Bruce Cameron, St. Louis, Mo.
M. J. Feron, Chicago, Ill.
C. B. Wells, Denver, Col.
C. S. Krick, New York, N. Y.
W. T. Woodruffe, Vancouver, B. C.
C. E. Learned, Boston, Mass.
J. T. Crabbs, Brooklyn, N. Y.

JOINT COMMITTEE (WITH ENGINEERING) ON BLOCK SIGNALS FOR ELECTRIC RAILWAYS

(Representing Transportation & Traffic Association.)
C. D. Emmons (vice-chairman), South Bend, Ind.
B. E. Merwin, Wheaton, Ill.
C. F. Conn, Scranton, Pa.

JOINT COMMITTEE (WITH ACCOUNTANTS) ON A STATISTICAL UNIT FOR CAR OPERATION

(Representing Transportation & Traffic Association.)
C. B. Buchanan (co-chairman), Richmond, Va.
Nathan H. Daniels, Jr., Boston, Mass.
J. A. Emery, New York, N. Y.

COMMITTEE TO DEVELOP UNIFORM DEFINITIONS FOR TERMS COMMONLY USED IN THE TRANSPORTATION DEPARTMENTS OF AMERICAN ELECTRIC RAILWAYS

M. C. Brush (chairman), Boston, Mass.
W. C. Callaghan, Rochester, N. Y.
I. H. McEwen, Utica, N. Y.

PRESERVATION OF POWER TRANSMISSION POLES*

BY W. R. WHEATON, TIMBER ENGINEER SAN JOAQUIN (CAL.) LIGHT & POWER CORPORATION

The increasing cost of power transmission poles in recent years and the high maintenance charges have turned the attention of power companies to some process to increase the life of the poles and to cut down the maintenance charges. The first cost of the poles has nearly doubled in the past six years, and these two factors have been largely responsible for the interest shown by operating power companies in pole preservation.

In March, 1908, the San Joaquin Light & Power Corporation set a line of Western yellow pine (Pinus ponderosa) poles. The line is about 30 miles long and contains approximately 600 poles. These poles were cut in the Sierras above Fresno at an elevation of about 4000 ft., and were thoroughly seasoned before treatment. Some of the poles received a brush treatment with carbolineum and with creosote, and the rest were treated in an open tank with creosote, zinc chloride and crude oil. The butt only was treated. Western yellow pine is very susceptible to a preservative treatment. Some of the butts were thoroughly penetrated with creosote and with zinc chloride, the average penetration (at the ground line) being 3 in. The penetration with crude oil averaged about 1½ in. The crude oil used was a heavy oil of asphaltum base supplied from the Kern River fields. In order to get a comparative life of the wood treated and untreated, stubs of untreated timber were set along the line about a mile apart. The writer inspected this line in June, 1910, at which time it had been set for twenty-seven months. The untreated stubs set along the line were completely rotten. Of the poles brush-treated with carbolineum and creosote the conditions were about the same, a large percentage of each showing signs of decay; 27 per cent of the poles that had a brush treatment with creosote showed signs of decay, and 29 per cent of the poles that had brush treatment with carbolineum showed decay, while 45 per cent of the poles treated with crude oil were slightly attacked by decay. Of the poles treated with zinc chloride, 28 per cent showed attack by decay. The poles treated with creosote in the open tank (over 50 per cent of the entire line were treated in this way) were all perfectly sound and showed absolutely no signs of decay.

In August, 1911, two of the poles in this line which had received a brush coating of creosote fell over, owing to decay at the butt. During August and September, 1911, the line was gone over and all of the poles which had had a brush treatment of creosote or carbolineum were so badly decayed that they were strapped to a creosoted cedar stub.

The above results speak for themselves. The value of the experiment is apparent and is enhanced by the fact that the timber used will entirely decay, without treatment, in a year.

The San Joaquin Light & Power Corporation is now treating Western red cedar poles at the butts only by the open-tank process. There is no necessity for treating the top, since the top is not subject to decay. With this process the outer ring of sap wood on the cedar poles is filled with creosote, and if the timber is thoroughly seasoned before treatment there is little difficulty in accomplishing this. The penetration varies from ½ in. to 1 in. with an absorption of from 7 lb. to 9 lb per cubic foot. As for the efficiency of the treatment, treated and untreated cedar poles have been set for four years. The creosoted poles are still perfectly sound, while the poles set untreated have decayed through the sap wood and into the heart.

The question has been asked why zinc chloride, copper sulphate or some preservative other than creosote has not been used to cut down the treatment charges. It was found that several poles treated with chloride of zinc were, after the installation of irrigation systems, in the middle of irrigated fields. The zinc was washed out of them, and the poles had to be replaced after a service of two years. The saving in the cost of treatment by the use of a metallic salt would not mean a saving in the end if many such replacements took place. A 50-ft. creosoted pole placed in the line means an investment of about $25. The use of chloride of zinc would cut this cost to about $24.25, and the saving is too small to be considered against the possibility of the loss of the preservative by leeching out after one or two years.

*Abstract of a paper read at the annual meeting of the Wood Preservers' Association, Chicago, Ill., Jan. 16-18, 1912.

DATA ON HAMBURG RAPID TRANSIT LINE

It is reported that the Hamburg elevated and subway line will be completed in February of this year. The total length of the line is 16.9 miles, of which 2778 ft. is a tunnel of circular cross-section and 19,286 ft. a tunnel of rectangular cross-section. There are also 2886 ft. of stone viaducts, 15,219 ft. of steel viaducts and twelve bridges totaling 1935 ft. The average distance between the thirty-three stations is 2700 ft. The station platforms are 197 ft. long, those in the open air being roofed over for two-thirds of their length. The approximate construction cost to date of the right-of-way, including track, has been $10,380,000; of street changes, etc., $4,725,000, and of land, $1,750,000. About $3,750,000 will be needed for operating equipment.

The municipality of Germiston, South Africa, is said to be considering plans to build an electric tramway at an estimated cost of $515,849.

Shop Methods*

A Description of the Problems Met and Overcome in Adapting a Medium-Size Shop with Few Special Facilities for a Great Variety of Car-Maintenance Work

BY E. P. DOYLE, MASTER MECHANIC AURORA, ELGIN & CHICAGO RAILROAD

My endeavor will be to confine myself to describing what I think are more or less original methods as practised in a small or medium-sized shop.

The master mechanic or superintendent of a railway operating a large number of modern cars with everything more or less standardized can put into practice the methods worked out by economic experts or others of established experience. He has a modern shop and machinery. He can develop specialists in the different classes of work and have enough of each kind to keep them going without change; or he can take most of the work and put it out at a piece price, thus keeping the cost to a predetermined figure without other supervision than the inspection of the completed job.

In attempting to compete with the car maintenance cost shown by such large shops the master mechanic of the small or medium-sized shop is working at a disadvantage. He has to develop men who can be changed efficiently from one class of work to something entirely different. Generally he lacks modern machinery and is even compelled sometimes to use machines which have been discarded by the larger shops as out of date. He has to modernize these machines as much as possible and devise attachments to make them do work not at all thought of by their original designers. The cost of material naturally is also higher, because his company is compelled to buy in small quantities. Yet, despite these handicaps in men, machinery and material, it is possible for him, if the proper methods are adopted, to keep his cost down to or even below that of the larger shops.

I will now describe some of the methods which have helped the Wheaton shops of the Aurora, Elgin & Chicago Railroad to bring the car maintenance cost down to its present low figure of $0.0124 per car mile. This cost, compared with that of other companies, is low because the cars operated on our Chicago division are considerably heavier than the average and run at high speed.

In 1906 this shop had the following machinery:

One 50-in. swing Niles wheel turning lathe (second hand).
One 50-in. swing engine lathe.
One 20-in. Hamilton drill press.
One 24-in. swing engine lathe.
One 12-swing engine lathe.
One 16-in. crank shaper.
One Acme bolt cutter.
One power hack saw.
One band saw (woodworking shop).

Since 1906 the following have been substituted:

300-ton wheel press for the 150-ton.
24-in. shaper for the 16-in.

In the same period the following machines have been purchased:

One 16-in. sensitive drill press.
One Beaudry power hammer.
One Universal saw table for the woodworking shop.
Two pneumatic drills.
One hammer.

In addition, the mechanics of this shop have designed and built the following labor-saving machines:

One hot-blast furnace for blacksmith shop.
One armature banding machine.
One field-coil winding machine.
One contactor-coil winding machine.
One commutator slotting machine.
One commutator slotting attachment for lathe.
One machine for boring and bushing compressor cylinders.
One wheel-boring attachment.
One gasoline equipment for babbitting bearings.
One gasoline equipment for soldering.
One gasoline equipment for gears, pinions and wheels.
A complete equipment of bench tools and jigs.

The hot-blast furnace in the blacksmith shop is made for burning coke. It is used for heating truck chafing plates and other ironwork that necessitates the heating of a larger area than is obtainable in an ordinary forge. It is also used for heating steel bushings, pins and bolts preparatory to case hardening.

The armature banding machine, besides doing the banding, is equipped with brush holders and carbons with connections leading from the load test panel of the switchboard. This arrangement provides a receptacle for armatures while they are subjected to a load test after being repaired or rewound. It is our practice to allow the armatures to attain a maximum degree of heat and to band them in this condition while the coils and insulation are soft, thus allowing the bands to press the windings into a more compact mass than is obtainable with cold banding.

The field-coil winding machine is of original design, and its range includes the small compressor fields and the large 1000-kw rotary converter coils. It is belt-driven and has a reversible feature, which greatly increases its efficiency. The belt is shifted and the brake released by means of a simple compressed air device which is operated by the workman's foot. The idea in designing and building this machine was to make it as self-operating as possible in order to avoid the strain put on the operator in starting and stopping it. The shop order shows that this machine cost $286 to build.

The machine for winding contactor and other small coils has a speed of from 1000 r.p.m. to 2300 r.p.m. It can be stopped instantly and reversed by a motion of the hand. The cost of this machine, aside from the 8-hp motor, would be covered by $10.

The commutator slotter will receive any of our motor armatures. It is operated by a belt from the line shaft. The operator has full control and can slot a GE-66 125-hp motor armature of 195 segments at an average total cost of 10 cents. The slotter attached to the 24-in. swing lathe allows the slotting of an armature, after turning the commutator, without taking the armature from the lathe. When swung back this device does not interfere with the use of the lathe for other work.

As this shop had no boring mill the wheel boring had to be done in the 54-in. swing lathe. The manufacturers of various boring tools were appealed to for an attachment to allow this lathe to do the work of a mill, but they had nothing to offer. Finally, our mechanics made a pattern and had a casting made that would bolt to the tool carriage. This casting was bored to receive a 3-in. and a 5-in. boring bar with micrometer-adjusted cutters (also made in this shop from an old axle). When either of these bars was inserted in the casting the tapered end was long enough to fit into the tailstock in place of the dead center, which was first removed. Thus the boring tool was made self-centering. This attachment more than doubled the wheel-boring capacity of this lathe. It will bore as many wheels per day as a mill and, including the boring tools, cost about one-tentieth as much.

Owing to the condition that gas was not available several gasoline tools, mostly of original design, had to be constructed. This equipment is now very complete. Regardless of the high fire hazard of gasoline, these tools were readily accepted by the underwriters, which fact speaks well for their design and construction. The babbitting outfit, besides the burners for heating the babbitt, includes gasoline-heated mandrils provided with clamps with auto-

*Abstract of paper read at meeting of the Illinois Electric Railways Association, Chicago, Jan. 19, 1912.

matic adjustment for holding the bearings. Every facility is provided to insure proper tinning, thus reducing to a minimum the chance that the babbitt linings will leave the bearing.

Besides the ordinary burners for heating the soldering coppers, the armature room has a burner that can be attached to a length of hose. The opening in the end of this burner is threaded, thus allowing the attachment of coppers of special design for the different armature jobs. The operator thus is provided with a tool of any chosen design, kept at a steady heat and transferable to any part of the armature department.

The gasoline tools for the wheel gear and pinion work are equally efficient.

The armature department of this shop is now handling the repairs and rewinding of the fields and armatures of 175 GE-66 motors, forty GE-57 motors, 190 Westinghouse No. 68 motors, eight Westinghouse 101-B2 motors, sixty-five compressor motors, the rotary converter equipment of six substations and the power house auxiliary motor.

HOW UTILITY MEN HAVE BEEN DEVELOPED

In a shop of this size some departments are bound to be overloaded with work at times. When this condition exists the shop organization must be such that other departments can be drawn on for help. For instance, this shop had one fire in its blacksmith shop and gradually found that it was necessary to work overtime, although there was not work enough to warrant keeping another blacksmith. The problem was solved by adding another forge and hiring a man who could do the lighter jobs of this class of work. He was then broken in to babbitt car bearings and do other odd mechanical jobs around the shop. Thus, instead of paying time and a half for overtime, the overload in the blacksmith shop was cared for at less than the regular blacksmith's rate.

The electrical repair gang can be drawn on by the pipe or air-brake gang when necessary. In like manner, the electrical repair gang can get assistance from the armature department helpers. The oil and waste removed from car bearings is reclaimed in an apparatus located conveniently near the man who takes care of the shop heating plant, so that he can handle this work also.

HOW COMPETITION BETWEEN DIFFERENT GANGS HAS BEEN ESTABLISHED

In order to develop competition between the different gangs and to arrive at a minimum cost of the different operations the system hereinafter described has been adopted. For instance, take the men who exchange trucks, motors and other car equipment. This shop has a gang of nine men available for such work. Instead of having these men in one gang under one sub-foreman, they have been formed into three gangs of three men each, with one of the men in each trio acting as gang foreman. When a car comes into the shop to have its trucks removed and motors changed the general foreman issues a work order to one of these gang foremen, with the necessary data as to the changes to be made. The time of issue is stamped on the order. When the work is completed the time is stamped on the order again. Thus the time necessary to complete the job can be readily seen. When more than one car at one time is in the shop for changes similar orders are issued to the other gang foreman, thereby giving an opportunity for comparison. Furthermore, when the work covered by a given order is completed the finishing time can be stamped thereon only by the general foreman, who is thus notified that this particular gang is looking for new work. These orders are issued for all work done throughout the shop. This timing practice prevents loafing between jobs, besides giving a permanent record of those responsible for the overhauling of a given car or other tasks. Of course, it has also been the means of establishing and automatically maintaining the minimum time necessary to perform the different operations.

TO AVOID WASTE THE WORKMAN SHOULD KNOW THE COST OF THE MATERIAL HE USES

I have found that a workman tends to be more careful of the material he uses if he knows its value in dollars and cents. Expensive material sometimes is very deceiving as to looks. For instance, in one daily inspection of the scrap pile (something every master mechanic of a small or medium-sized shop can do to his company's profit) I found ten worn oil collars that go on the armature shafts. On questioning the man who applies such collars, I found they were scrapped because they allowed the armature too much lateral motion. I took this man to the storehouse, where we found that the collars cost $6 each, or $60 for the ten. I then showed him that a ¼-in. shim behind the collar would remedy the trouble and make them practically as good as new. Since then this man has taken pains to learn the price of everything he uses. At the end of each month every man in our shop who is concerned with the use of material gets a list of the amount he employs with the price of the different parts, together with the cost per 1000 car miles and a comparison of the average cost for previous months.

I think that this is a safe plan to pursue, for as a rule when workmen destroy or waste material they do not do it maliciously, but through ignorance of its value. Show them the monetary value of the material they use and you will stimulate an interest that it is well to cultivate.

In 1895, when heavy electric car equipment first came into general use, I was an inspector and pitman helper. At that time it was the practice to insert a large key in the bottom end of the king pin as a precaution to prevent the pin from working up. It was the duty of the inspector to see that this key was in place, as the accomplishment of this feat was more or less difficult. One evening, while eating his supper, the thought came over him that he did not get this key into place in the last car that he had O. K.'d before quitting work. This thought preyed on his mind so much that he could not sleep. About midnight he got up, dressed, rode about 2 miles to the shop, put on his overalls and then examined the car to assure himself that the key was in place. This is an example of the interest shown by the men of that shop.

It is one of the requisites of a master mechanic that he should be able to inspire his men with this enthusiastic spirit of self-sacrifice and devotion to company interests.

CO-OPERATIVE INFORMATION BUREAU AT BOSTON

The Boston Co-operative Information Bureau was established at the Massachusetts Institute of Technology on Jan. 10 to act as a clearing house of special knowledge and to facilitate the acquisition of information which is ordinarily more or less difficult of access. The bureau will in many cases afford an opportunity to consult publications which are of too highly specialized character for circulation in public libraries, and will put specialists of various kinds in touch with one another. Members will be of three kinds —co-operating, who are expected to submit to the bureau, as far as is practicable, a statement of their specialties or of the literature they are prepared to loan on occasion; subscribing members, who will receive a monthly bulletin in return for nominal dues, and full members, who are both co-operating and subscribing. Among the organizations which have agreed to co-operate are the Massachusetts Institute of Technology, the Harvard University Library, the Public Works Department of the city of Boston, Stone & Webster, the Crocker-Wheeler Company, the library of Congress, and the United States Departments of Commerce and Labor and of Agriculture. R. P. Bigelow, librarian of the Massachusetts Institute of Technology, is president of the bureau, and the secretary and treasurer is G. Winthrop Lee, librarian for Stone & Webster, Boston.

THE MILWAUKEE MEETING OF THE WISCONSIN ELECTRICAL ASSOCIATION

(*By Telegraph*)

The fourth annual convention of the Wisconsin Electrical Association convened at 9:30 a. m. Jan. 18, 1912, in the clubroom of the Pfister Hotel at Milwaukee, Wis. About eighty members representing the various central stations and electric railways of Wisconsin, along with the various representatives of supply houses, were present. Several of the members were delayed by late trains on the steam railroads. Among them were George B. Wheeler, secretary and general manager Chippewa Valley Railway, Light & Power Company and president of the association. In his absence, Irving P. Lord, vice-president Waupaca Electric Light & Railway and first vice-president of the association, acted as chairman. It was necessary to revise the program because of the detentions, but everything went along smoothly.

Following the reading of the minutes of the last meeting George Allison, comptroller Eastern Wisconsin Railway & Light Company and secretary and treasurer of the association, reported briefly on the financial standing of the association. He said that the association has prospered financially since revising the method of assessing dues to one-half of 1 per cent on the gross earnings.

C. N. Duffy, comptroller Milwaukee Electric Railway & Light Company, then presented a very able report from the committee on insurance, which was composed of William A. Kelly, Peter Valier and Mr. Duffy. The committee recommended that the association follow the recommendations of the American Electric Railway Association and employ an insurance expert who will investigate properties relative to fire hazards and make recommendations for protective apparatus. This committee also recommended that the present committee be made a standing committee on fire insurance, fire protection and fire prevention. The report of the committee was adopted as read with no discussion.

W. B. Voth, chief engineer Sheboygan Railway & Light Company, then read his paper on the "Relation of the Central Stations to the Wiring and Supply Business." This paper was discussed at length by P. H. Korst, William John S. Allen and Irving P. Lord.

Egbert Douglass, sales manager Milwaukee Electric Railway & Light Company, followed with a paper on the "Commercial Development of the Central-Station Business," which was illustrated by lantern slides showing data of particular interest to central-station managers.

At the close of Mr. Douglass' paper Mr. Lord resigned the chair to Mr. Wheeler, who had just arrived. In the preidential address which followed Mr. Wheeler dwelt upon the importance of discussing and solving the problems before the association. He said that the success or failure of all utilities in the State was at stake. Although the organization was holding its fourth annual convention, it was really twenty years old, as it was a reorganization of the old Northwestern Electrical Association. Mr. Wheeler then emphasized the desirability of having public utility corporations cultivate a favorable public sentiment. He recommended that a committee be appointed to investigate some method whereby all companies may be associated in their publicity campaigns.

At the close of this address Mr. Lord moved that a committee be appointed to formulate motions which would best carry out President Wheeler's recommendations. The meeting then adjourned for luncheon.

A. E. Peirce, assistant manager Chippewa Valley Railway, Light & Power Company, opened the afternoon session with a paper on "Power Solicitation in a City of 20,000 Inhabitants." The discussion on this subject was followed by an address by C. H. Crownhart, chairman Industrial Commission of Wisconsin, who spoke on the workingmen's compensation laws. Mr. Crownhart advocated mutual insurance savings for the benefit of the workingman and an abstract of his address appears elsewhere in this issue.

P. H. Korst, Janesville, reported that favorable opinions had been received from a number of Wisconsin companies on the subject of industrial insurance. Accident insurance was also discussed by W. S. Winslow, Superior; Ernest Gonzenbach, Sheboygan; R. H. Kimball, Kenosha, and Mr. Block, of St. Louis. The last-named speaker outlined a mutual indemnity exchange plan of insurance for utility companies.

Arthur W. Fairchild, Milwaukee, next presented a detailed review of public utility legislation in Wisconsin during 1911. Prof. D. W. Mead, Madison, in an illustrated address, outlined the principles of stream run-off and floods. He described the Black River dam disaster of October, 1911, and advocated adequate state supervision of hydraulic structures for protection against floods.

R. H. Pinkley, Milwaukee, closed the afternoon program by presenting illustrated plans of the new Cold Spring car shops of The Milwaukee Electric Railway & Light Company, a preliminary description of which was published in these columns in the issue for Feb. 4, 1911.

A report of the concluding sessions of the Wisconsin Electrical Association and the election of officers for the ensuing year will be published in the next issue of this paper.

ANNUAL REPORT OF BOSTON TRANSIT COMMISSION

The seventeenth annual report of the Boston Transit Commission has been made public by the board. It consists of 133 pages of material reviewing the progress of work handled by the board in the year ended June 30, 1911, and includes besides the record of expenditures on Boston subway work and investigations of various kinds since the organization of the commission appendexes containing legislative reports required during the year and other information bearing upon the study of rapid transit problems in the heart of Boston. During the year the Boston Elevated Railway Company paid a rental of $211,750 for the use of the Tremont Street subway and $248,000 for the use of the Washington Street tunnel. The net cost of the former was about $4,100,000 and of the latter $7,556,000.

An important part of the report describes the subway and tunnel construction which the board is carrying forward in building the Boston connection of the Cambridge Main Street subway, under Beacon Hill and the West End. For the present the new line will terminate at Park Street, Boston, where an underground station below the present subway station is being built. Three platforms will be provided, with lengths of 350 ft. each, the central platform being devoted to loading on the island plan, while the two outside platforms are designed for unloading service. Six stairways are being provided between the old and new stations. Entrances and exits will also be installed on Tremont Street to facilitate the segregation of traffic. On account of the depth of the station below the surface escalators will be provided for exit service. The trackage arrangements will permit the simultaneous loading of two five-car trains. There will be a ticket office lobby on the Tremont Street side of the station, with short stairway connections to the sidewalks and leading platform. The commission points out that the present platform congestion at Park Street will be materially relieved upon the opening of the Cambridge subway. The construction work on the new station has been handled without discommoding the existing traffic, either on the street surface or in the old subway. About $18,400,000 has been expended by the commission since its establishment seventeen years ago.

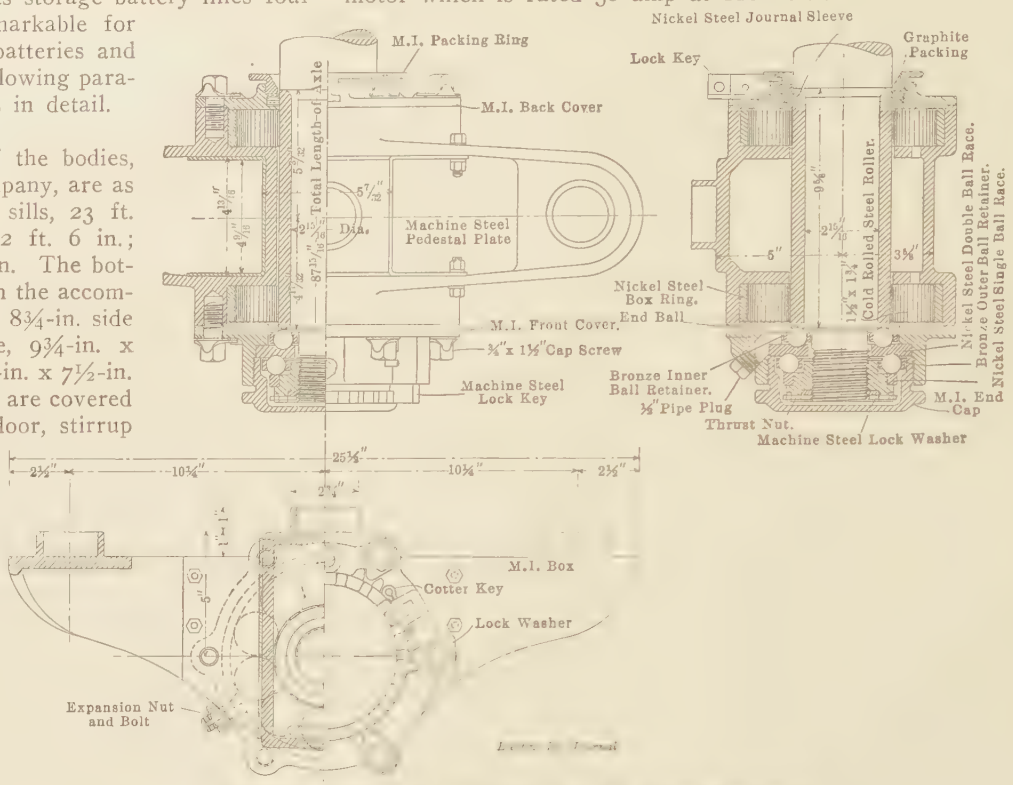
STORAGE BATTERY SNOW SWEEPERS WITH ANTI-FRICTION BEARINGS

The Third Avenue Railway, New York, has recently placed in service for use on its storage battery lines four snow sweepers which are remarkable for their equipment with storage batteries and anti-friction bearings. The following paragraphs describe these sweepers in detail.

CONSTRUCTION

The principal dimensions of the bodies, as built by The J. G. Brill Company, are as follows: length over the end sills, 23 ft. 7 in.; length over the cab, 22 ft. 6 in.; width over the sills, 6 ft. 5¼ in. The bottom framing, which is shown in the accompanying plan, consists of 4¾ x 8¾-in. side sills of long-leaf yellow pine, 9¾-in. x 5¾-in. end sills of oak and 3¾-in. x 7½-in. crossings of oak. The end sills are covered with ¼-in. plate. A sliding door, stirrup and grab handle are provided on each side of the body. Each end of the car has a vestibule front with three windows. The center window is arranged to drop, the side windows being stationary. There are no windows on the side of the sweeper.

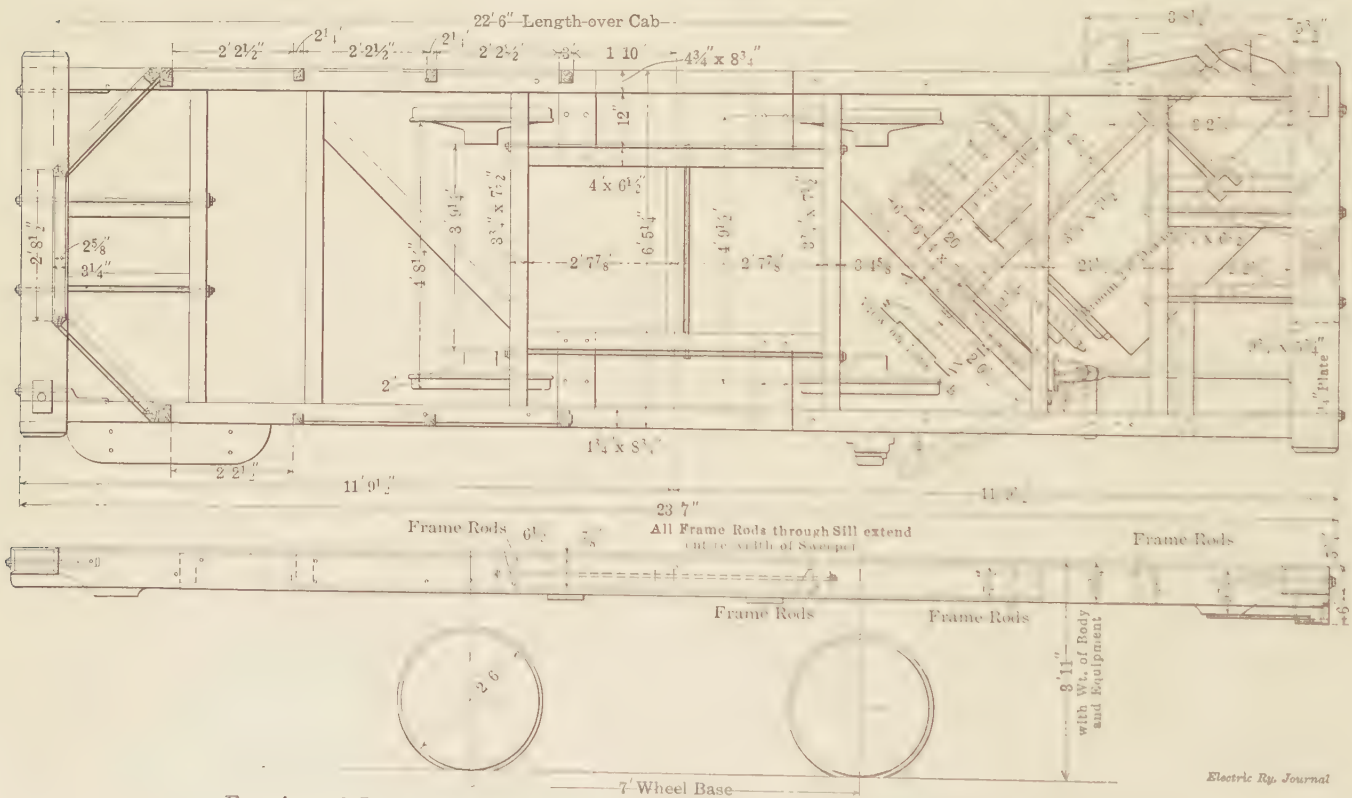
Each body is mounted on a Brill truck of 7-ft. wheelbase. The wheels are of the Lobdell cast-steel type of 30-in. diameter, 2-in. tread and ⅝-in. x ⅞-in. flange. The axles are of 4-in. diameter at the wheel seat and motor bearing and 4 1/16-in. at the gear seat. The trucks are equipped with half-ball brake hangers. The brake leverage is arranged to give 11 lb. pressure on each wheel with 1 lb. on the pull rod. In addition to carrying the weight of body and motors, the pedestal springs must care for storage batteries weighing up to 5 tons.



Sections of Rollway Journal Box for Snow Sweeper

BROOM DRIVE AND ELECTRICAL EQUIPMENT

Each of the two brooms per car is driven by a GE-1022 motor which is rated 30 amp at 110 volts. These motors are not carried in the car body but are placed on the broom framework, whence they drive the brooms by means of sprocket chains. The broom motor is supported on hollow shafts inside the sills and crossings. These shafts are supported at the ends by malleable hangers and the free end of each motor is bolted rigidly to the underframe.



Framing of Storage Battery Snow Sweeper for Third Avenue Railway, New York

The two traction motors are of the GE-1027 type geared 93:15 and rated at 60 amp on 110 volts. An interesting feature of the traction drive is that the two running axles are tied together by means of a chain drive which runs over a sprocket wheel on each axle. This connection insures an equal division of the load and thereby prevents any slipping while the motors are in series. The storage battery equipment consists of two sets mounted in the car. Each set comprises fifty-eight cells of 420 amp-hour capacity at 110 volts.

ANTI-FRICTION BEARINGS

The broom axles and motors are furnished with Hess-Bright ball bearings and the car journals with Rollway roller bearings. The roller bearings are similar to those used on thirty-five storage battery passenger cars of the Third Avenue Railway except that the double end thrust has been shortened 1¾ in. to meet the conditions imposed by narrow streets and congested traffic. This shortening has been obtained by enlarging the diameter of the outer ball race so that a part of the thrust nut on the axle journal comes under the balls and retainer. The twenty cold-rolled steel rollers are 1¾ in. diameter x 1½ in. long and the eighteen balls for the end thrust duty are ¾ in. diameter. The ball retainers are made up in a bronze single-piece ring. The box has exceptionally long wings, which support a spiral spring at each end. The box contains a central oil reservoir feeding into both roller raceways and will carry about 3 lb. of oil.

In connection with the foregoing references to anti-friction bearings it may be of interest to state that the Third Avenue Railway has now in use eighty storage battery cars with Hess-Bright ball-bearing armature bearings. Of this

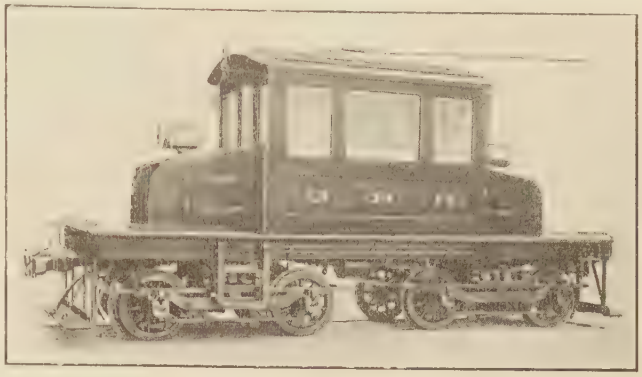
Storage Battery Snow Sweeper.

number fifty cars also have Rollway roller-bearing journals, twenty have Hess-Bright ball-bearing journals and ten have S. K. F. ball-bearing journals.

The London *Engineer* for Nov. 24 contains an "Electric Traction Supplement" of sixteen pages, describing the history and present status of electric transportation in the United Kingdom. The supplement is fully illustrated. The historical article gives an especially complete account of the primary-battery electric locomotive built by Robert Davidson between the years 1837 and 1842 and tried in the latter year on the Edinburgh & Glasgow Railway. The locomotive was 16 ft. long and 7 ft. wide. It weighed with batteries more than 5 tons and made several runs at a speed of 4 m.p.h. The Port Rush and Brighton Beach railways were put in service in 1883. Two of the existing car equipments on the latter line are twenty-five years old. Recent important installations are also described.

LOCOMOTIVE FOR THE GUELPH RADIAL RAILWAY

The Guelph (Ont.) Radial Railway has recently purchased a 27-ton Baldwin-Westinghouse direct-current locomotive. The cab, trucks and all mechanical parts were built by the Baldwin Locomotive Works, Philadelphia, Pa., and the electrical equipment, including motor and control,



Guelph Electric Locomotive.

was furnished by the Canadian Westinghouse Company, Ltd., Hamilton, Ont., after the design of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

This locomotive is compactly built and may be used for freight and switching service. The frame is of channel-iron construction, and the cab of ash, fitted together with joint bolts and corner plates. The trucks are of the electric M.C.B. equalizer-bar type, with chilled cast-iron wheels. The electrical equipment consists of four type No. 101-B2, 40-hp, 500-volt railway motors and G-28-B control. It is also equipped with Westinghouse automatic and straight-air brakes with outside equalizing driver brakes. The principal dimensions are: Length over end sills, 23 ft.; width over all, 8 ft.; truck centers, 12 ft.; rigid wheelbase, 6 ft.; total wheelbase, 18 ft., and wheel diameter, 33 in.

The hauling capacity of this locomotive is given in the table below:

NUMBER OF CARS WEIGHING 45 TONS WITH LOAD, SPEED 10.75 M.P.H., AT 500 VOLTS

Straight, Level Road	*Maximum Grade		
	½ per cent	1 per cent	2 per cent
17 cars	7 cars	4 cars	2 cars

*On a fairly level and straight road the load to be handled is determined by the maximum grade.

The figures given for "straight, level road" show the load which may be handled in switching service. The values given under "maximum grade" are safe when the grade requires a pull of but five minutes' or ten minutes' duration. In any particular case the number of cars that can be handled may be greater or less than the values above tabulated, depending upon the profile, curves and operating conditions.

ANNUAL CONVENTION OF IDAHO CEDARMEN'S ASSOCIATION

The annual meeting of the Idaho Cedarmen's Association was held in Spokane on Jan. 8, 1912. In the absence of President Lindsley, G. C. Davis was elected temporary chairman. The retiring officers, C. P. Lindsley, president, and H. C. Culver, secretary-treasurer, were unanimously re-elected.

A resolution was passed appointing a committee to prepare a set of by-laws for the association, and H. C. Culver, G. E. Merrill and E. A. Lindsley were appointed for this purpose. The committee was especially instructed that a provision for the appointing of official inspectors to settle disputes between customers and the members of the association should be incorporated in these by-laws.

A committee consisting of Neil Burrell, M. P. Flannery and W. M. Leavitt was appointed to bring before the rail-

roads and the Master Car Builders' Association a complaint relative to the size and number of car stakes required by the M. C. B. rules. It is the feeling of the members of the association that the present requirements are more stringent than necessary, both as to the number and size of the car stakes and the amount of wire required to hold the loads.

The application of the Lost Creek Cedar Company for membership was received and accepted. The report of the publicity committee was read and accepted. It is the intention of the association to co-operate with the government in making tests as to the strength of the various species of cedar used for pole purposes, and the committee was instructed to give the government every assistance possible.

MORE FLAT-ARCH CARS FOR JACKSONVILLE, FLA

The Jacksonville Traction Company has recently purchased from the St. Louis Car Company ten double-truck cars which are similar to the ten cars described in the Electric Railway Journal of Dec. 24, 1910. The principal features are the use of a semi-steel closed-car body with the rear bulkhead moved in from the end sill, flat-arch roof, clamshell detachable hoods, swinging gate and folding step on front platform, stationary step and dividing rail on the back platform, double sliding doors in rear bulkhead and single sliding door in front bulkhead. The conductor stands in the space between the rear bulkhead and the edge of the car-body floor. The front platform has a double, outward-swinging gate 5 ft. high. This gate is operated by the motorman in conjunction with the exit step.

The principal dimensions of these cars are as follows:

Jacksonville Car—Motorman's Platform

length over the corner posts, 29 ft. 6½ in.; length over the bulkheads, 26 ft. 6 in.; length over the buffer plates, about 41 ft.; width over the sheathing, 8 ft. 4 in.; width inside below the windows, 8 ft. 3½ in.; height from top of floor to point of arch, 6 ft. 3⅛ in.; width of aisle, 26½ in. The distance between the rear doors when open is 42 in. The 5-in x 3-in. x ⅜-in. side-sill angles extend from center to center of the end sills in one piece. The 2½-in. x 5-in. oak cross sills are reinforced with 3/16-in. x 4-in. steel plate and angle irons. The end sills are of 4½ x 6¾-in. oak and the end sill fillers of 4½-in. x 3¼-in. oak. The end sills are tenoned into 3½-in. x 5-in. oak side-sill fillers and

Jacksonville Car—Conductor's Platform

bolted to angle irons. The end-sill fillers are bolted to the end sill and angle irons. The outside platform knees are 7-in. x 3½-in. x ½-in. angle iron reinforced by a 3-in. x 2½-in. x ½-in. x 48-in. riveted angle. The angle iron knee filler is of 1¼-in. x 3-in. oak and the center platform knees of 2½-in. x 6-in. oak. The body bolster is of cast steel. The body flooring is yellow pine and the platform flooring is of oak.

The side posts are of 2-in. x 2-in. x ¼-in. T-iron and extend in one piece from one side sill to the other to form both post and carline. The outside lower panel is of 3 16-in. x 15-in. steel plate, extending to the center of the end sill in one piece. The upper outside panel is of No. 16 sheet steel and the upper panel filler of 3 16-in. Agasote. The roofing is of ¼-in. Agasote with No. 8 roof canvas. All doors and lower sash are of mahogany. The windows are furnished with Pantasote curtains and the Curtain Supply Company's ring fixtures. The lower sash is provided with Edwards fixtures and a compression roller on each side.

The miscellaneous equipment of the cars includes Sterling-Meaker hand brakes, General Electric straight-air brakes with National engineer's valves, Consolidated buzzer push-button system, Hunter illuminated hood destination signs, U. S. headlights and Knutson retrievers. The electrical equipment includes two GE-219 motors per car with two controllers, although the car is intended for single-end operation. The necessary wiring is all laid in conduit.

The weights of the Jacksonville cars are as follows: Body complete, 12,500 lb.; trucks, 9000 lb.; electrical equipment, 7000 lb., and air brake, 1800 lb., making a total of 30,300 lb., or 350 lb. per seated passenger. These weights indicate that this car is one of the lightest semi-steel designs in use.

News of Electric Railways

Purchase of Trail Cars to Be Recommended in Cleveland

Peter Witt, street railway commissioner of Cleveland, Ohio, will recommend the purchase of 100 trail cars instead of the fifty motor cars that the company was prepared to buy. Mr. Witt contends that 100 trailers can be purchased for about the same amount that would have to be paid for the fifty motor cars and that no additions to the power equipment would be necessary to operate them. Trailers have been tested in Cleveland several times, but they have always been discarded.

For some time Mr. Witt has been taking a poll of the people using the Superior Avenue line to learn whether they would be willing to eliminate every other stop. Mr. Witt has also asked for an expression of opinion in regard to turning the Payne Avenue cars at the Public Square, instead of allowing them to run to the Union Station. He will ask East Cleveland to allow East Cleveland cars to be turned at the same point. What are known as Windemere cars start at the Windemere carhouse on Euclid Avenue about midway between the eastern and western boundaries of East Cleveland. Most of these cars are turned at the Public Square now.

Decision in New York in Regard to Extension Paralleling Steam Line

The Public Service Commission of the Second District of New York has granted the Catskill Traction Company permission to construct an extension from Leeds to Cairo, a distance of approximately 7 miles, in Greene County. The building of the extension was opposed by the Catskill Mountain Railway, which parallels the authorized extension. The Catskill Mountain Railway contended that the extension was unnecessary and that it would seriously damage the existing railroad property.

In an opinion written by Commissioner Sague it is recited that, although the proposed extension will parallel the existing steam railroad between Catskill and Cairo, the electric railway would not depart from the highway and would therefore serve the local traffic along the highway better than the steam railroad does; and that while the summer train service between Cairo and Catskill appears to be adequate as supplied by the steam railroad, the service of the electric railway through the winter would be a great convenience. From the record of earnings of the Catskill Mountain Railway the commission did not feel that it could require winter service or a reduction of rates on the steam railroad. The operation of the electric railway when the steam railroad discontinues operation would be a decided convenience to the permanent residents. There is not enough business in the territory to support two parallel steam railroads, but the proposed extension is allowed because the electric railway is to be continuous with the present line through Catskill, will connect with the ferry and the West Shore Railroad at Catskill, and will operate throughout the year. Before granting the application the commission required the company to agree that the bond issue for the extension shall not exceed $80,000 par value, or $11,900 per mile. The balance, amounting to about $60,000, is to be supplied by the sale of 6 per cent cumulative stock by the company at par.

The commission believes that the electric railway will have but little adverse effect on the earnings of the Catskill Mountain Railway and that the new line may build up the territory and justify the establishment of additional accommodations for summer boarders, and in the end increase the freight traffic and thus at least partially offset any reduction in the passenger earnings of the Catskill Mountain Railway.

Car Contract in San Francisco Illegal

City Attorney Long of San Francisco, Cal., recently submitted an opinion to the effect that the Board of Public Works of San Francisco could not legally award a contract for the cars for the Geary Street municipal railway to the W. L. Holman Company, San Francisco, Cal., at a price which was more than the one submitted by the lowest bidder. In reviewing the conditions which governed the bids submitted by car builders the city attorney in his opinion says:

"The Jewett Car Company's bid was the lowest regular bid, the McGuire-Cummings Manufacturing Company's the next lowest and the W. L. Holman Company bid the highest of the three. The provision of Sec. 17 that 'the board may reject any and all bids' does not permit the board to reject the lowest regular bid and award the contract to the highest bidder. A contract entered into with the Holman Company would be void for the reason that the board did not let the contract in the mode designated by the charter."

At a subsequent meeting of the Board of Public Works the board formally rescinded the previous action awarding the contract to the W. L. Holman Company. This action was in accord with a letter from the Holman company requesting the board to rescind the contract. New bids will now have to be called for.

The grand jury in San Francisco, after finding much to question in connection with the construction of the Geary Street municipal railroad, has for the time being discontinued its investigation. The inquiry thus far has developed that certain men were paid for work they did not perform; that jobs were filled with non-civil-service employees; that nearly one-third of the money set aside for the construction of the road has been expended, and that the original estimate of $395,000 for material and labor will be exceeded. For track construction $270,000 was appropriated, of which $83,000 has been spent for work in the soft ground at the western end of the road. The same rates of expenditure in the solid concrete roadbed of the old cable line will exhaust the appropriation and leave practically all of the difficult work undone.

The investigation taken up by the grand jury was transferred to the Board of Public Works and centered about Superintendent Patrick Broderick, who resigned some time ago from the board to superintend the work on the Geary Street line. The board finally decided that a superintendent of construction would not be needed for the remaining part of the city railroad, as the day labor plan would not be followed in building it. Instead this work will be done by contract. The roadbed has been laid from Fifth Avenue to Thirty-third Avenue on Geary Street, a distance of 8710 ft., and on Tenth Avenue from Geary Street to Fulton Street, 2702 ft. The distance from Fifth Avenue to Kearny Street is 17,408 ft.

On Jan. 8 San Francisco passed from the rule of the Union Labor party under Mayor P. H. McCarthy to her new Mayor, James Rolph, Jr. In his inaugural message Mayor Rolph, in discussing the transportation question, said in part:

"The Geary Street railroad must be completed, expanded and extended as expeditiously as the city's finances will permit. Our law officers should press the suit to extend the Sutter Street line to the ferry to as early a conclusion as possible, and, if the suit is decided in favor of the city, the Geary Street road should be promptly extended to the ferry. The construction and operation of railways by private capital, subject to the right of acquisition by the city on payment of cost and a reasonable bonus, under the charter provision recently adopted, should be encouraged. To make this charter provision of practical use, it becomes necessary to repeal another charter clause providing that no street railway franchise shall extend beyond a period of twenty-five years.

"Such an automatic ending of a franchise is unnecessary in case the city has the power to acquire a street railway whenever it is ready to own and operate it. Indeterminate franchises are permisible under our State constitution. Should we be disappointed in the expectation that private capital can be induced to extend existing roads under a system of indeterminate franchises, nothing remains but the building of an adequate system before the opening of the exposition by the city itself."

New Agreement in Toledo Formally in Force

The new 3-cent tickets were furnished to conductors on all lines of the Toledo Railways & Light Company, Toledo, Ohio, at noon on Jan. 12, 1912, and they were used during the rush hours in the afternoon. The transfers to be used with these tickets had not arrived at that time, but the old transfers were continued to avoid disorder. To facilitate business, ticket sellers will be placed at two points on Summit Street. The total number of fares collected during the rush hours on Jan. 8, the first day of the 3-cent fare, was 32,994, or 8,000 less than normal for those hours. Frank R. Coates, president of the company, attributed this to the weather. The following day 34,200 3-cent fares were collected, and on Wednesday 36,364 were collected.

City Solicitor Schreiber and Attorney Rathburn Fuller have arranged to begin work on the final ordinance on Jan. 16, 1912. This draft, if it can be agreed upon by the attorneys, will be used in effecting a settlement of the franchise question.

On Jan. 11, 1912, both the city and the company established complaint departments, although neither knew of the action of the other. City Solicitor Schreiber asked that each passenger act as a committee of one to see that all fares are properly recorded so that there can be no question about the result of the temporary test of the low fare. The complaint department of the company is referred to in the department "Traffic and Transportation," elsewhere in this issue.

Pennies were used through the week before the tickets were received, and very few people paid the 5-cent fare. The interurban lines continued to charge a 5-cent fare for passengers who rode within the city limits. The question of the fare on the interurban cars has been taken up by the railway officials, but a decision has not yet been reached.

At the meeting of the City Council on Jan. 8, 1912, it was decided to return the 3-cent fare ordinance, passed on Dec. 31, 1911, to the committee of the whole. In his message to the City Council Mayor Whitlock said in part:

"The city had asked for seven tickets for a quarter temporarily, and this concession is the equivalent of seven tickets for a quarter and in some respects is better than seven tickets for a quarter, in that during the period of the day when traffic is heaviest the people will actually be riding for 3 cents. This rate benefits especially those portions of the population that do the real work of the city and gives them now what we have so long been struggling to obtain for them, namely, a 3-cent fare; that is, the benefit goes where it is most needed and where it is most deserved.

"Aside from the question of rate of fare, the city will now have the opportunity, under the eye of an auditor appointed by the city, to learn something of the effect of the stimulus to traffic of 3-cent fares on which we have so long counted to make them effective. But greater than all is that moral victory which comes from the recognition by the company of the principle for which this city has so long contended. I am not without hope that this temporary arrangement will in a measure do away with certain recent differences and soften somewhat the asperities that arose from them, and that now, by the negotiations which I am about to suggest, a settlement may be reached which will be honorable and just to all, and under which, until the time comes when the city can own and operate its own street car system (for which, of course, provision must be made) the company will carry passengers at the cost of service and the service will be dictated by the city, a principle upon which happily the city and the company now seem to be as one."

Provisions of Bill to Amend Detroit City Charter to Provide Municipal Ownership of Street Railways

There will be submitted to the electors of Detroit, Mich., on Jan. 23, 1912, a bill to amend the city charter so as to provide that the city shall acquire or construct and own and operate a street railway system. Nothing contained in the amendment, however, is to be so construed as to prevent the city from making a grant to private parties in relation to a street railway system on its streets. It is provided that a board of street railway commissioners of five members is to be elected at the first general or special election after this amendment becomes a law. Their successors are to be elected at the general election in the spring of 1915, and thereafter the term of each commissioner is to begin July 1 and continue for two years. Said board may purchase or lease or condemn all or any part of the existing street railway property. If it shall be found impossible or impracticable to acquire the property by any of these means, then the board may, with the people's consent, proceed to construct, own or operate a street railway system. Any contract to purchase or any plan to condemn existing street railway property is to be void unless approved by three-fifths of the electors voting thereon at any general or special election.

It is provided that the Common Council shall, on request of the street railway commission, issue bonds of the city, to be known as general bonds, to the amount of 1 per cent of the assessed value of the real and personal property in the city. Said bonds shall be payable at such time or times and at such rate of interest as the board and the Common Council may determine, and the proceeds shall be used for the purpose of securing, in some one of the ways provided, a public street railway system. The Common Council shall likewise, on request of the street railway board, issue additional bonds of the city, to be known as street railway bonds, in such denomination and payable at such time or times and bearing such rate of interest as the Council and said board may determine. These shall be secured only upon the property and revenues of the street railway system, including a franchise stating the terms upon which, in case of foreclosure and purchase, the purchaser may operate the same, which franchise shall in no case extend for a longer period than twenty years from the date of the sale of the street railway system and the franchise on such foreclosure.

The issuance of bonds of any description is prohibited until a franchise has been prepared by the commissioners and ratified by three-fifths of the electors voting thereon. Such franchise shall permit bonds to be issued and sold thereunder for not less than par. When a franchise has been approved by the electors, the street railway board may request and Common Council shall sell general bonds and enough of said street railway bonds to complete the payment of the purchase price, or the award in the condemnation proceedings, or the cost of construction of said plant, and provide a suitable and necessary amount of working capital; and whenever any extension to said street railway is authorized Council shall sell a further amount of said street railway bonds sufficient to pay the actual cost of the extension and no more. No issue of bonds, however, is to be made unless the same be approved by three-fifths of the electors voting thereon.

The board shall supervise, manage and control the entire public street railway system of Detroit as fully and completely as if it represented private owners, without further approval or confirmation of the contracts by the Common Council of Detroit. The board shall report its doings to the Common Council annually and at such other times as the Common Council may request.

The rate of fare on said street railway system shall be sufficient to pay, and the said board shall cause to be paid: (a) Operating expenses, including paving and watering between tracks. (b) Taxes on the physical property of the entire street car system, the same as though privately owned. (c) Fixed charges. (d) A sufficient per cent per annum to provide a sinking fund to pay the principal of the bonds issued at their maturity.

The board is authorized to supply and sell from its surplus electricity for light, heat and power. The Common Council and the Board of Estimate shall appropriate for the preliminary expense of investigation by said board such portion of $100,000 as the board may demand.

Montreal and Province Line Electrification Considered.—E. H. Fitzhugh, president of the Montreal & Southern Counties Railway, has retained B. J. Arnold, Chicago, to report upon the advisability of electrifying the Montreal & Province line of the Central Vermont System and making it part of the Montreal & Southern Counties Railway.

Conference in Indiana to Consider Rails.—The Indiana Railroad Commission has called a conference for Feb. 8,

1912, at room 85, State House, Indianapolis, to consider the quality of steel rails used in steam and in interurban railway construction in Indiana. The commission has requested general managers, superintendents, engineers and those in charge of maintenance of way of steam and electric railroads to attend the conference, as well as rail manufacturers.

Subway Section Contract Awarded in New York.—The Public Service Commission of the First District of New York has awarded the contract for Section 3 of the new subway to the lowest bidder, the Underpinning & Foundation Company, New York, for $2,295,086.50. There were altogether thirteen bidders, the next two being Frederick L. Cranford, Brooklyn, with an offer of $2,387,932, and the Bradley Contracting Company, New York, with a bid of $2,676,989.50.

Car Ferry at Evansville.—The Evansville (Ind.) Railways has contracted with the Dubuque Boat & Boiler Works, Dubuque, Ia., for a steel-hull boat 120 ft. long, with 25 ft. beam, to be used to ferry cars across the Ohio River between Evansville, Ind., and Paducah, Ky. The boat will be equipped with two 60-hp gasoline engines made by the Buffalo Gasoline Motor Company, Buffalo, N. Y., and will have a double steering gear, to enable it to make the trip across the river without turning around. The boat was designed by M. Whitaker, marine architect, New York, N. Y.

Western Society of Engineers.—At the forty-second annual meeting and dinner of the Western Society of Engineers, held at the University Club, Chicago, Ill., on Jan. 10, 1912, the result of the recent election of officers was announced as follows: President, W. C. Armstrong; first vice-president, A. Bement; second vice-president, G. T. Seely; third vice-president, E. C. Shankland; treasurer, A. Reichmann; trustees, W. W. Curtis, E. McCullough, J. G. Glaver. Secretary J. H. Warder reported briefly the year's work, and the retiring president, O. P. Chamberlain, the incoming president, Mr. Armstrong; Dr. W. F. M. Goss, of the University of Illinois, and Judge Marcus Kavanagh, of Chicago, made addresses.

Debate on Public Service Commission.—The subject "Is the Public Service Commission a Public Benefit?" was debated by Frederick W. Whitridge, president of the Third Avenue Railway, New York, and Thomas Mott Osborne, former member of the Public Service Commission for the Second District of New York, under the auspices of the People's Forum in New Rochelle, N. Y., on Jan. 14, 1912. Mr. Whitridge said that the course of the commission for the first district, under whose jurisdiction the Third Avenue Railway comes, had cost the company more than $150,000, not one dollar of which it would have been necessary to expend had the commission been a business body. In referring to the orders and rules issued by the commission Mr. Whitridge said: "Two defects in the business methods of the commission may be noticed. The members seem to have a passion for making orders and for the declaration of general rules. I think it is obvious to anybody that the very large amount of business transacted by a street railway must be done upon the judgment of the operating officers and by the use of common sense, of which no general rules will take the place. In consequence of this desire to make orders the commission up to a year ago has issued eight times as many orders as the up-State commission, and I don't know how many more orders than the Inter-State Commerce Commission, which had the whole country under its jurisdiction."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

KENTUCKY

A bill affecting electric railways which operate in fourth-class cities in Kentucky has been introduced in the House It provides that street railways must pay for reconstructing that part of the street occupied by the railroad tracks and 18 in. on the outside of the tracks. An amendment to the charters of cities of the fourth class will be necessary to ratify the measure in case of its enactment.

MASSACHUSETTS

A protracted discussion is anticipated in connection with House Bill No. 384, accompanying the petition of the Massachusetts branch of the American Federation of Labor relative to the hours of labor of street railway employees. The bill provides that a day's work shall not exceed nine hours and that it shall be performed inside of eleven consecutive hours. On legal holidays and Sundays and in case of accident or unavoidable delay extra labor may be performed for extra compensation. Two bills have been introduced in the House which provide for the electrification of steam railroads within the Boston metropolitan district. One bill would require the work to be done by July, 1922, and the other by July, 1915. In general, the abolition of the steam locomotive as called for in the bills is specified within an area extending 10 miles from the existing railroad terminals. The recommendation of Governor Foss that a single public utility commission should be established has resulted in a bill for the organization of such a board, with authority to regulate the principal public service corporations in Boston proper. A bill has been filed which provides that every stockholder of a consolidating railroad or street railway shall be deemed to assent to the decision of the Railroad Commission regarding the terms of the transaction unless by writing within ninety days he files a specified objection with the board. The value of shares held by the stockholder dissenting from the consolidation terms is to be determined by the Supreme Court of the State through three appointed commissioners. A bill has been filed which provides that it shall be unlawful for any person or corporation operating a street or elevated railway to carry in any car more than five passengers who are unprovided with seats. House Bill No. 420 would require all double-truck cars to be equipped with air brakes and all cars with seats for motormen. A bill has been filed which would provide for the public inspection of recommendations by the Railroad Commission to street railways in connection with changes in fares, repairs deemed necessary, or alterations recommended in respect to operating methods. Another bill would require the board to include in its annual report such statements, facts and explanations as would disclose the working of railroad and railway transportation in its bearing upon the business and prosperity of the State. Representative Washburn has introduced a bill to increase the powers of the Railroad Commission with respect to the rates and service of common carriers by granting to the board the right to institute action upon rates and facilities without waiting for complaints from outside sources.

PROGRAM OF ASSOCIATION MEETINGS

New England Street Railway Club

The regular monthly meeting of the New England Street Railway Club will be held at the American House, Boston, Mass., on Thursday evening, Jan. 25, 1912. At the conclusion of the regular business meeting at 8 p. m. W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, will give an address on the subject "Electrification of Trunk Line Roads." Dinner will be served at 6:30 p. m.

Railway Appliances Association

The Railway Appliances Association will hold its fourth annual exhibit of appliances used in the construction, maintenance and operation of railways at the Coliseum, Chicago, Ill., March 18 to 23, inclusive, at the time of the annual convention of the American Railway Engineering Association. The exhibit will occupy the main floor, annex and balcony of the Coliseum, as in previous years, and the First Regiment Armory, Michigan Avenue and Sixteenth Street, containing 16,000 sq. ft. of net floor space for exhibit purposes, which, with the Coliseum, will give a total of 54,000 sq. ft. of exhibit space. More than 50,000 sq. ft. has already been reserved by the different exhibitors. On Tuesday of the week devoted to the exhibits, the American Railway Engineering Association will adjourn its session at 4 p. m. to give the railway men an opportunity to devote the remainder of the afternoon and evening to the inspection of the exhibits. Applications for space should be made to Bruce V. Crandall, secretary, 537 South Dearborn Street, Chicago.

Financial and Corporate

New York Stock and Money Markets

Jan. 18, 1912.

The principal active issues in the New York stock market have recently recorded small fractional changes, but some heretofore inactive issues have shown a marked tendency in the direction of higher prices. Tractions have been much less in evidence in New York, but elsewhere they have been very active. Rates in the money market to-day were: Call, 1¾@2¼ per cent; sixty days, 2½@2⅝ per cent; ninety days, 3@3¼ per cent.

In the Chicago market City Railway 5s sold to-day at 102¾ and Chicago Railways 5s at 100⅛. Metropolitan 4s sold at 85¾ and Metropolitan Extension 4s at 82¾ and 83.

The Philadelphia market was on edge, first, over the report of the probable formation of a holding company to take over the power plants of the Philadelphia Electric and Rapid Transit companies, and later over the announcement that the Rapid Transit Company would issue $4,000,000 of bonds in the spring.

There has been no activity in tractions in Boston.

In Baltimore the bond market has again been active. United Railways and Pennsylvania Water & Power 5s leading.

Quotations of traction and manufacturing securities as compared with last week follow:

	Jan. 10.	Jan. 17.
American Brake Shoe & Foundry (common)	a92¾	a92¾
American Brake Shoe & Foundry (preferred)	a132½	a132
American Cities Company (common)	25¾	a26½
American Cities Company (preferred)	78	a78
American Light & Traction Company (common)	a297	a300
American Light & Traction Company (preferred)	a108	a108
American Railways Company	a45	a45⅛
Aurora, Elgin & Chicago Railroad (common)	a41¾	a40½
Aurora, Elgin & Chicago Railroad (preferred)	85½	a86½
Boston Elevated Railway	a133	a133½
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	74	74
Boston & Worcester Electric Companies (preferred)	58	54
Boston & Worcester Electric Companies (common)	a12½	a12½
Brooklyn Rapid Transit Company	78¼	78½
Capital Traction Company, Washington	a124⅞	a123⅞
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a34	a40
Chicago Elevated Railways (preferred)	a92	a92
Chicago Railways, ptcptg., ctf. 1	a105	a104
Chicago Railways, ptcptg., ctf. 2	a47¾	a37
Chicago Railways, ptcptg., ctf. 3	a11	a11
Chicago Railways, ptcptg., ctf. 4	a6	10¾
Cincinnati Street Railway	a130½	a130
Cleveland Railway	a105	a105
Cleveland, Southwestern & Columbus Ry. (common)	a47⅞	*47⅞
Cleveland, Southwestern & Columbus Ry. (preferred)	a33	a33
Columbus Railway & Light Company	a37½	a37½
Columbus Railway (common)	83	83
Columbus Railway (preferred)	90½	90½
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a101	a101
Denver & Northwestern Railway	*145	*145
Detroit United Railway	a85	85
General Electric Company	159	a159¾
Georgia Railway & Electric Company (common)	a178	a173
Georgia Railway & Electric Company (preferred)	a90	a88
Interborough Metropolitan Company (common)	18	17¼
Interborough Metropolitan Company (preferred)	56⅜	55¼
International Traction Company, 4% notes, rcts.	69½	69½
Indiana Union Traction Company	12	12
Kansas City Railway & Light Company (common)	a22	a22
Kansas City Railway & Light Company (preferred)	a52	a51
Lake Shore Electric Railway (common)	a67⅞	*67⅞
Lake Shore Electric Railway (1st preferred)	a85	*85
Lake Shore Electric Railway (2d preferred)	a22	*22
Manhattan Railway	135⅛	a137
Massachusetts Electric Companies (common)	22	a22½
Massachusetts Electric Companies (preferred)	a96	a96
Metropolitan Street Railway, New York	*8	*8
Milwaukee Electric Railway & Light (preferred)	a104¾	104¾
Norfolk Railway & Light Company	26	*26
North American Company	75	a75¼
Northern Ohio Light & Traction Company (common)	a65	a60
Northern Ohio Light & Traction Company (preferred)	a105	a105
Philadelphia Company, Pittsburgh (common)	a51¼	a50½
Philadelphia Company, Pittsburgh (preferred)	a44	a43¾
Philadelphia Rapid Transit Company	a23½	a23½
Portland Railway, Light & Power Company	a99⅝	*99⅝
Public Service Corporation	a109	a108
Seattle Electric Company (common)	a110	a112
Seattle Electric Company (preferred)	a101	a102
Third Avenue Railroad, New York		*57⅞
Toledo Railway & Light Company		a31
Twin City Rapid Transit, Minneapolis (common)	a106	a106
United Ry. & Electric Company, Baltimore	18	18½
United Rys. Inv. Co. (common)	31	31
United Rys. Inv. Co. (preferred)	48	50
Virginia Railway & Power Company (common)	30	a48
Virginia Railway & Power Company (preferred)	81	81
Washington Ry. & Electric Company (common)	86	59¾
Washington Ry. & Electric Company (preferred)	a82½	88¾
West End Street Railway, Boston (common)	a87½	a87½
West End Street Railway, Boston (preferred)	a102	a101½
Westinghouse Elec. & Mfg. Co.	73¼	73¼
Westinghouse Elec. & Mfg. Co. (1st pref.)	117½	*117½

a Asked. *Last sale.

Annual Meeting of Columbus (Ohio) Railway

At the annual meeting of stockholders of the Columbus (Ohio) Railway on Jan. 11, 1912, a new board of directors, consisting of nine members, instead of five as in the past, was elected. Only one of the directors, George Hardy, was a member of the old board. The other directors are: L. P. Matthews, Springfield; D. Meade Massie, Chillicothe; William Worthington, Cincinnati; C. D. Hinman, Edward Johnson, W. C. Willard, F. R. Huntington and A. D. Heffner, Columbus. The directors organized by electing the following officers: D. Meade Massie, Chillicothe, president; F. R. Huntington, Columbus, first vice-president; A. D. Heffner, second vice-president; C. D. Hinman, secretary; W. C. Willard, treasurer. The report of President Sheldon, which was read in the afternoon, was very brief.

Following the adjournment of the annual meeting, the special meeting, called for the purpose of authorizing an increase in the capital stock, was held. D. Meade Massie offered a motion to proceed to ballot on the amended resolution, sent out to stockholders prior to the meeting, which was as follows: "Resolved, That the capital stock of the Columbus Railway be and the same is hereby increased from $7,000,000, its present capital stock, to $8,000,000, divided into 10,000 shares of $100 each, 5000 shares of which, aggregating $500,000, shall be preferred stock and the remainder thereof, 5000 shares, aggregating $500,000, shall be common stock. About 55,000 shares of a total of 70,000 shares were voted in favor of the resolution, there being no dissenting votes. About 15,000 shares were not represented at the meeting.

The annual meetings of the stockholders of the Columbus Traction Company, formerly the Central Market Street Railway, and the Columbus Light, Heat & Power Company took place at the offices of the Columbus Railway & Light Company on Jan. 11. All of the old directors were re-elected. In turn the boards organized by re-electing the officers.

Binghamton (N. Y.) Railway.—A dividend of 4 per cent, an increase of 1 per cent, has been declared by the Binghamton Railway, 2 per cent payable on Feb. 15 and 2 per cent on Aug. 15.

Boise & Interurban Railway, Ltd., Boise, Idaho.—New officers have been elected as follows for the Boise & Interurban Railway: W. S. Kuhn, president; Jerome Hill, vice-president; W. B. McCain, secretary; J. B. Van Wagener, treasurer.

Brooklyn (N. Y.) Rapid Transit Company.—Theodore F. Miller, president of the Brooklyn Trust Company, has been elected a director of the Brooklyn City Railroad to succeed Eugene Britton, resigned.

Chicago (Ill.) City Railway.—The ordinance authorizing the Chicago City Railway to absorb the property of the Chicago & Southern Traction Company within the corporate limits of Chicago was approved by the committee of the City Council on local transportation on Jan. 15.

Chicago (Ill.) Railways.—The Chicago Railways has agreed to resume the dividend of 8 per cent on participating certificates and pay accumulated dividends, $16, as soon as possible, in consideration of stockholders withdrawing suit to prevent bond issue for purchase of the lines of the Chicago Consolidated Traction Company.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—Settlement of all difficulties among the bondholders of the Chicago & Milwaukee Electric Railroad has been effected, according to an announcement made by A. C. Frost, formerly president of the company, on Jan. 16, 1912. The representatives of the Illinois and Wisconsin bondholders grant the demands of John R. Thompson for a place on the committee and payment of his obligations for the litigation of his claims. George M. Reynolds, president of the Continental and Commercial National Bank, is chairman of the new organization committee. Other members are: Ernest A. Hamill, W. E. Stavert, George A. Somerville, Miller Lash, Robert Cassells, R. F. Clinch, E. A. Shedd, John R. Thompson and H. S. Osler. The work of concluding a tentative operating agreement with the Northwestern Elevated Railway awaits the return from Europe in February of Samuel Insull, chairman of the elevated merger committee.

Chicago & Oak Park Elevated Railway, Chicago, Ill.—Francis V. Dobbins has been appointed receiver of the Chicago & Oak Park Elevated Railway, the holding company. Samuel Insull is receiver for the Chicago & Oak Park Elevated Railroad, the operating company. Percy Hayes, Bertram Stiff, L. H. Burger and Mortimer H. Bradley have been elected directors of the Chicago & Oak Park Elevated Railway.

Citizens' Light & Transit Company, Pine Bluff, Ark.—The report that negotiations for the purchase of the property of the Citizens' Light & Transit Company had been concluded by the Equitable Securities Company, New York, N. Y., could not be confirmed at the office of the latter company.

Eastern New York Railroad, Ballston Spa, N. Y.—The stockholders of the Eastern New York Railroad, on Jan. 8, 1912, voted to reduce the capital stock of the company from $500,000 to $275,000. The receiver of the company has been discharged.

Georgia Railway & Electric Company, Atlanta, Ga.—A meeting of the stockholders of the Georgia Railway & Electric Company has been called for Jan. 30, 1912, to vote to lease the property to the Georgia Railway & Power Company. The granting of the application made by the Georgia Railway & Power Company to the Railroad Commission for permission to issue $57,000,000 of stocks and bonds was referred to in the ELECTRIC RAILWAY JOURNAL of Jan. 13, 1912, page 75.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.—Press dispatches from Grand Rapids, Mich., dated Jan. 17, 1912, announce the purchase of the Grand Rapids, Grand Haven & Muskegon Railway by the United Railways & Light Company, incorporated recently in Maine.

Interborough-Metropolitan Company, New York, N. Y.—Stockholders of the Interborough-Metropolitan Company, at their annual meeting on Jan. 16, 1912, ratified the action of the directors in entering into an agreement with Hallgarten & Company for a loan not to exceed $2,000,000 to help defray the assessment on the stock of the Metropolitan Street Railway held by the Interborough-Metropolitan Company, in accordance with the terms of the reorganization of the Metropolitan Street Railway. The stockholders voted to change the company's fiscal year so as to end June 30 instead of Dec. 31, and to hold the annual meeting on the third Tuesday of September instead of the third Tuesday of January. President Shonts said that on account of the sale of the property of the Metropolitan Street Railway at foreclosure it was impossible to give a statement covering the calendar year, and so an income account for the twelve months ended June 30 had been prepared. This statement showed a total income of $3,376,445, made up of $3,052,152 dividends on stock of the Interborough Rapid Transit Company and $324,293 interest. Disbursements totaled $3,569,246, so that the year showed a deficit of $182,801. The disbursements included $3,052,125 interest on bonds of the Interborough-Metropolitan Company, $392,964 interest on 6 per cent notes, $7,937 interest on bills payable, $83,527 office expenses, and $32,692 taxes. The previous surplus was $871,301, so that the surplus of June 30, 1911, was $691,500. Robert I. Jenks, Charles B. Ludlow and B. J. Pepperman were elected directors to fill the vacancies caused by the resignation of Thomas F. Fowler and Gardiner M. Lane and the death of James Jourdan. Four directors whose terms had expired were re-elected for three years.

Marquette County Gas & Electric Company, Ishpeming, Mich.—L. E. Myers, of the L. E. Myers Company, and his associates have exercised the option which they obtained recently on the property of the Marquette County Gas & Electric Company.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has signed an order formally terminating the receivership of the Metropolitan Street Railway and approving the assignment and delivery of the property to the New York Railways.

Milford, Attleboro & Woonsocket Street Railway, Milford, Mass.—The Milford, Attleboro & Woonsocket Street Railway has petitioned the Railroad Commission for authority to issue $50,000 of first mortgage 5 per cent gold bonds, proceeds to be applied to the payment of money borrowed or indebtedness incurred in construction already completed. This issue is the balance of an indenture of $300,000 placed on the property July 23, 1901, of which $250,000 hae already been issued.

Newport News & Old Point Railway & Electric Company, Newport News, Va.—Allen & Peck, Inc., has taken over the property of the Newport News & Old Point Railway & Electric Company, the Citizens' Railway, Light & Power Company, the Hampton Roads Traction Company, the Newport News Gas Company and the Distilled Ice Company of Virginia, as noted on page 93 of this issue of the ELECTRIC RAILWAY JOURNAL.

New York Railways Company, New York, N. Y.—Harry Bronner, of Hallgarten & Company, has been elected a director of the New York Railways Company to succeed Joseph P. Cotton, Jr., resigned. Mr. Bronner goes on the board as a representative of the bondholders. The Public Service Commission, First District, held another hearing on Jan. 17, 1912, on the plan for the reorganization of the Metropolitan Street Railway, and except for some technical details which are to be considered on Jan. 22 the inquiry was ended.

Portland (Me.) Railroad.—The directors of the Portland Railroad have recommended the sale of the stock of the company to interests identified with the Portland Light & Power Company on the basis of $118 a share for all or a majority of the total of $2,000,000 of stock.

Sunbury & Northumberland Electric Railway, Sunbury, Pa.—It has been decided to consolidate the Sunbury & Northumberland Electric Railway and the Sunbury & Selinsgrove Electric Street Railway as the Sunbury & Susquehanna Railway. William H. Greenough will be president and other officers are as follows: Directors, D. A. Howe, Williamsport; W. W. Hepburn, Philadelphia; C. M. Clement, Sunbury; A. R. McNitt, Bellefonte; W. H. Lyons, Sunbury, and Boyd A. Musser, Scranton; secretary, William H. Bloom, Williamsport; treasurer, Boyd A. Musser.

Third Avenue Railway, New York, N. Y.—Frederick W. Whitridge has been elected a director of the Third Avenue Railway to succeed James A. Simpson, resigned. The reorganization plan of the Third Avenue Railroad was approved on Jan. 17, 1912, by the Public Service Commission, First District, but in doing so the commission made it plain that it was only obeying the recent opinion of the Court of Appeals and that it merely passed on the validity of the formal steps taken.

Virginia Railway & Power Company, Richmond, Va.—The New York Stock Exchange has listed $8,203,000 of first and refunding mortgage 5 per cent bonds of the Virginia Railway & Power Company with authority to add $1,800,000 of additional bonds on notice of issuance in exchange for underlying bonds, making the total amount to be listed $10,003,000. The bonds of the company have also been listed upon the Philadelphia exchange.

Dividends Declared

Athens Railway & Electric Company, Athens, Ga., 2½ per cent, preferred.

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.

Columbus (Ohio) Railway, quarterly, 1¼ per cent, preferred.

Danbury & Bethel Street Railway, Danbury, Conn., 2 per cent.

East St. Louis & Suburban Railway, East St. Louis, Ill., quarterly, 1¼ per cent, preferred.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Havana (Cuba) Electric Railway, quarterly, 1½ per cent, preferred; quarterly, 1½ per cent, common.

Jacksonville (Fla.) Traction Company, quarterly, 1½ per cent, preferred; quarterly, 1¾ per cent, common.

Mexico (Mex.) Tramways, quarterly, 1¾ per cent.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent, preferred.

Public Service Investment Company, New York, N. Y., quarterly, 1½ per cent, preferred; common, 1½ per cent.

Railways Company General, New York, N. Y., quarterly, 1 per cent.

United Traction Company, Pittsburgh, Pa., 2½ per cent, preferred.

York (Pa.) Railways, 2 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE ELECTRIC COMPANY

Period.			Gross Revenue.	Operating Expenses.	Net Revenue.	Fixed Charges.	Net Income.
1m.,	Nov.,	'11	$10,707	$6,171	$4,537	$2,042	$2,494
1 "	"	'10	9,747	5,681	4,066	1,968	2,099
12 "	"	'11	118,026	72,439	45,586	24,170	21,417
12 "	"	'10	109,338	70,435	38,902	23,128	15,774

BROCKTON & PLYMOUTH STREET RAILWAY

1m.,	Nov.,	'11	$8,116	$6,698	$1,418	$1,481	$63
1 "	"	'10	8,026	6,472	1,554	1,571	17
12 "	"	'11	118,833	85,365	33,468	18,374	15,095
12 "	"	'10	119,955	84,953	35,002	20,394	14,609

BROOKLYN RAPID TRANSIT SYSTEM

1m.,	Oct.,	'11	$1,944,329	$1,237,738	$706,591	.....	.....

CENTRAL PARK NORTH & EAST RIVER RAILROAD

1m.,	Oct.,	'11	$55,591	$54,259	$1,332	.....	.....

CLEVELAND, PAINESVILLE & EASTERN RAILROAD

1m.,	Nov.,	'11	$27,403	$16,466	$10,938	$8,541	$2,396
1 "	"	'10	27,037	15,111	11,925	7,948	3,977
11 "	"	'11	337,970	186,292	151,679	91,608	60,071
11 "	"	'10	328,236	170,555	157,681	88,638	69,043

CONEY ISLAND & BROOKLYN RAILROAD

1m.,	Oct.,	'11	$101,406	$80,818	$20,589	.....	.....

EL PASO ELECTRIC COMPANY

1m.,	Nov.,	'11	$62,684	$33,001	$29,682	$8,560	$21,122
1 "	"	'10	59,986	33,438	26,548	8,224	18,324
12 "	"	'11	683,282	387,978	295,304	99,182	196,122
12 "	"	'10	635,157	364,663	270,494	100,916	169,578

HUDSON & MANHATTAN RAILROAD

1m.,	Oct.,	'11	$269,598	$116,024	$153,574	.....	.....

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK

1m.,	Oct.,	'11	$2,707,569	$1,229,577	$1,477,992	.....	.....

LAKE SHORE ELECTRIC RAILWAY

1m.,	Nov.,	'11	$95,828	$57,103	$38,726	$34,625	$4,101
1 "	"	'10	91,302	50,792	41,010	34,670	6,341
11 "	"	'11	1,165,685	622,207	543,478	381,651	161,828
11 "	"	'10	1,110,541	570,893	530,648	382,347	148,301

METROPOLITAN STREET RAILWAY, NEW YORK

1m.,	Oct.,	'11	$1,210,060	$779,615	$430,446	.....	.....

NEW YORK & QUEENS COUNTY RAILWAY

1m.,	Oct.,	'11	$105,370	$112,008	$6,637	.....	.....

NORTH CAROLINA PUBLIC SERVICE COMPANY

1m.,	Nov.,	'11	$23,414	$14,721	$8,693	$5,500	$3,193
1 "	"	'10	19,182	12,466	6,716	4,167	2,550
12 "	"	'11	251,985	151,879	100,107	60,667	39,440
12 "	"	'10	.....	.....	.....	.....	.....

NORTHERN OHIO TRACTION & LIGHT COMPANY

1m.,	Nov.,	'11	$214,563	$125,204	$89,359	$43,730	$45,629
1 "	"	'10	189,706	110,719	78,987	43,367	35,621
11 "	"	'11	2,454,651	1,359,562	1,095,089	487,120	603,969
11 "	"	'10	2,235,453	1,233,947	1,001,506	476,894	524,612

PHILADELPHIA RAPID TRANSIT COMPANY

1m,	Dec.,	'11	$1,964,272	$1,168,293	$795,978	$741,502	$54,476
1 "	"	'10	1,838,997	1,114,681	724,316	715,004	9,312
6 "	"	'11	11,344,408	6,858,488	4,480,920	4,430,323	55,597
6 "	"	'10	10,732,534	6,530,419	4,202,115	4,384,316	†182,200

PORTLAND (ORE.) RAILWAY, LIGHT & POWER COMPANY.

1m.,	Nov.,	'11	$541,934	*$250,134	$291,800	$130,807	$160,993
1 "	"	'10	498,953	*254,182	244,771	119,616	125,155
11 "	"	'11	5,780,306	2,813,164	2,967,142	1,377,530	1,589,612
11 "	"	'10	5,108,927	2,490,683	2,618,244	1,274,696	1,343,548

ST. JOSEPH (MO.) RAILWAY, LIGHT, HEAT & POWER COMPANY

1m.,	Nov.,	'11	$94,577	*$60,322	$34,255	$19,381	$14,874
1 "	"	'10	87,644	*48,561	39,083	18,708	20,375
11 "	"	'11	997,884	*625,361	372,523	211,900	160,623
11 "	"	'10	942,007	*550,957	391,050	202,264	188,786

THIRD AVENUE RAILROAD, NEW YORK

1m.,	Oct.,	'11	$314,813	$167,367	$147,446	.....	.....

UNION RAILWAY, GAS & ELECTRIC COMPANY, ROCKFORD, ILL.

1m.,	Nov.,	'11	$290,240	*$162,432	$127,808	$63,751	$64,057
1 "	"	'10	265,668	*147,056	118,612	59,546	59,066
11 "	"	'11	2,864,796	*1,646,146	1,218,650	679,999	538,651
11 "	"	'10	2,687,557	*1,562,223	1,125,334	641,501	483,833

WHATCOM COUNTY RAILWAY & LIGHT COMPANY, BELLINGHAM, WASH.

1m.,	Oct.,	'11	$37,506	$18,099	$16,407	$9,771	$6,637
1 "	"	'10	37,696	18,142	17,478	8,249	8,249
12 "	"	'11	426,487	208,143	182,367	128,032	54,334
12 "	"	'10	430,020	239,237	171,679	104,976	66,703

*Includes taxes. †Deficit.

Traffic and Transportation

Interurban Passenger Traffic Out of Indianapolis

Interurban cars in and out of the Indianapolis Traction & Terminal Station, Indianapolis, Ind., carried 6,279,822 passengers in 1911, according to the annual report of E. B. Peck, vice-president of the Terre Haute, Indianapolis & Eastern Traction Company. In 1910 the total was 5,718,946. Last year the average was 17,205 passengers a day, while for the previous year the daily average was 15,668 passengers. The statement showing the total number of trains arriving and departing from the Indianapolis Traction & Terminal Station follows:

	1911			1910		
Month	Passenger	Freight	Total	Passenger	Freight	Total
Jan.	15,357	1,823	17,180	14,211	1,703	15,914
Feb.	13,997	1,745	15,742	12,636	1,603	14,239
March	15,476	2,118	17,594	14,421	2,036	16,457
April	15,148	1,955	17,103	14,212	1,961	16,173
May	16,800	2,037	18,837	15,109	1,908	17,017
June	15,567	2,037	17,604	14,712	1,977	16,689
July	16,605	2,038	18,643	16,032	2,070	18,102
Aug.	16,431	2,164	18,595	16,032	2,070	18,102
Sept.	16,614	1,943	18,557	18,001	1,960	19,961
Oct.	15,595	2,088	17,683	15,794	1,898	17,692
Nov.	15,105	1,971	17,076	15,131	1,873	17,004
Dec.	15,923	1,940	17,863	15,883	1,945	17,828
Total	188,618	23,859	212,477	182,174	23,004	205,178
Average per day	517	65	582	499	63	562

Through limited trains are operated between Indianapolis and the cities given in the following table, which includes the distance of the cities from Indianapolis, the running time and the number of trains each way daily:

	Miles	Time	No. Trains Daily Each Way
Fort Wayne, Ind.	136	4 hours 35 min.	10
Goshen, Ind.	160	5 "	2
Louisville, Ky.	117	4 "	6
Dayton, Ohio	110	4 " 10 "	6
Terre Haute, Ind.	72	2 " 15 "	7
Marion, Ind.	72	2 " 35 "	2
Lafayette, Ind.	70	2 " 10 "	10
Richmond, Ind.	70	2 " 35 "	7
Muncie, Ind.	57	1 " 45 "	2
Connersville, Ind.	58	1 " 30 "	6
Greensburg, Ind.	49	1 " 30 "	7

The statement by months of passengers carried follows:

Month	1911	1910
Jan.	396,280	353,888
Feb.	398,830	329,321
March	425,930	420,242
April	465,769	434,343
May	597,201	491,048
June	616,189	512,065
July	714,290	574,154
Aug.	644,928	576,565
Sept.	593,397	617,617
Oct.	502,841	497,872
Nov.	439,167	449,162
Dec.	485,000	462,669
Total	6,279,822	5,718,946
Average per day	17,205	15,668

The first interurban electric railway operating into Indianapolis was the Indianapolis, Columbus & Southern Traction Company, which inaugurated a service between Indianapolis and Greenwood on Jan. 1, 1900. The next was the Indianapolis & Eastern Railway, opened between Indianapolis and Greenfield on June 17, 1900. The most recent line to enter Indianapolis was the Indianapolis, Newcastle & Toledo Electric Railway, which opened on June 29, 1910.

Heating Inspection Tests on the Chicago Street Railways

The Health Department of Chicago recently made more than 600 inspections of temperature on surface cars and, after an allowance of 5 deg. below the legal minimum, found only 118 cases on which to enter suit. The ordinance which covers this subject reads as follows: "Cars shall be kept heated at a temperature of 50 deg. Fahr., as nearly as practicable, and each car shall contain a standard thermometer appropriately placed to enable passengers to see that this provision is complied with."

The law is vague, particularly the clause "as nearly as practicable," and will always be a source of contention between the company and the public. The latter are inclined to make the legal variation too small and the companies find it impossible to comply with the law on some of their old cars in the extremely cold weather experienced during

the first part of January, 1912. Until they have sufficient time to rebuild or replace these old cars without great financial loss the companies will be at a disadvantage. While the companies are endeavoring to comply with the ordinance, they are questioning the validity of the heating requirements as contained in the ordinance.

Cold Causes Suspension of Traffic.—The Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis., was forced to close its power plant on Jan. 10, 1912, and suspend the operation of its lines on account of lack of power caused by the freezing of the Fox River. On Jan. 10 the temperature at Appleton was 20 deg. below zero.

Keeping Platforms Clear in Harrisburg, Pa.—Frank B Musser, president of the Central Pennsylvania Traction Company, Harrisburg, Pa., has notified the Railroad Commission in response to the complaint about crowded rear platforms that it is the policy of the company to keep platforms clear except in rush hours and that the rules will be enforced.

Ruling on Fenders in Pennsylvania.—The State Railroad Commission of Pennsylvania on Jan. 16, 1912, ruled that it is the duty of every electric railway to equip its cars with fenders. The ruling was the result of a complaint against the Cumberland Railway, operating between Carlisle, Mount Holly and Newville. The company contended that its franchises did not require it to equip its cars with fenders.

Instruction of Men in Atlanta.—The Atlanta *Constitution* for Jan. 7, 1912, published a full-page article with news of the school for motormen and conductors and the accommodations supplied to them by the Georgia Railway & Electric Company, Atlanta. The article is entitled "Learning Courtesy on the Hoodlum Car." The course of the employee is followed from the time at which he becomes connected with the company until he has become a veteran.

Fare Case in Flint, Mich.—The ordinance passed by the Common Council of Flint, Mich., requiring the Saginaw & Flint Railway to carry passengers to the city limits as recently extended for a 5-cent fare went into effect on Jan. 1, 1912. The city limits were extended after the Saginaw & Flint Railway had been granted a franchise and the company has been charging a 10-cent fare to the new limits. It was announced that the company and the city had agreed upon a test case before the courts to establish their respective rights.

Conference in Indiana in Regard to the Delivery of Coal by Railroad.—The Indiana Railroad Commission has called a conference of representatives of all coal-carrying railroads, to be held in Terre Haute, to discuss ways and means of moving coal so as to keep all public utilities, power houses, etc., supplied. The commission has recently been called on to use its authority in facilitating shipments of coal to several Indiana public service companies which have been handicapped by the inability of the coal carriers to deliver shipments.

Washington Suburban Fare Case Decided by the I. C. C.—The Interstate Commerce Commission has ruled in connection with the complaint of citizens of Somerset, Drummond and Friendship Heights, Md., against the Washington & Rockville Railway, the Georgetown & Tenleytown Railway and the Washington Railway & Electric Company, Washington, D. C., that the traffic is interstate, and that the increased fare is unreasonable to the extent that it exceeds a cash fare of 5 cents or six fares for 25 cents, which fares are prescribed for the future.

Baltimore Company Aids in Securing Democratic Convention.—The United Railways & Electric Company, Baltimore, Md., assisted in securing the Democratic National Convention for Baltimore by promptly subscribing $5,000 to the fund of $100,000 to defray the expense incident to the convention. W. A. House, president of the company, says that the officers are determined that nothing shall be left undone by the company which will reflect credit on the city and advance its interests in the eyes of the strangers who are expected to visit Baltimore during the convention.

Car Steps in Philadelphia.—T. E. Mitten, chairman of the executive committee of the Philadelphia (Pa.) Rapid Transit Company, has informed the Railroad Commission of Pennsylvania that in the plans for the near-side cars the company has been able to reduce the height of the step so that it will be carried nearer the ground than is the step of any other double-truck car. He also says that, in accordance with the commission's suggestion, a suitable hand rail has been provided at the entrance of the car and that considerable added length has been given to the cross seats.

Department of Complaints in Toledo.—The Toledo Railways & Light Company has created a department of complaints, in charge of E. R. Kelsey, director of publicity for the company, and has asked its patrons to send by mail or to make personally complaints as to service or suggestions looking to the betterment of the service. Complaints will be investigated and a report will be made to the complainant. It has been found in the past that most complaints are made under misunderstanding, and the company believes that a much closer relationship with the public can be secured through a department of complaints. Complaints that come to the city and to the local newspapers are being referred to the complaint department of the company for adjudication.

La Follette Campaigned Illinois Via the Illinois Traction System.—Robert M. La Follette, United States Senator from Wisconsin, and his party made a 300-mile trip over the McKinley line, starting from Joliet, the northern terminus of the Chicago, Ottawa & Peoria Railway, and making addresses in all the larger cities along the line as far as Bureau. Here the party took a steam railroad to Peoria. Thence they were carried on President McKinley's private car to Bloomington, Decatur, Springfield and St. Louis. The trip was made on schedule, although the temperature was below zero. George W. Quackenbush, general traffic manager, and Fred A. Stowe, Chicago traffic representative for the McKinley lines, were in charge of the party.

X-Rays Used in Accident Case.—A feature in the trial of a street railway accident case at East Cambridge, Mass., recently was the introduction of X-ray lantern slides by counsel for the plaintiff and also by the defendant to demonstrate the condition of the victim to the jury. The plaintiff was injured in a rear-end collision on the Newton Street Railway near Newton Lower Falls, Mass. The company questioned the amount of personal damage sustained. A specialist in X-ray work who represented the company showed the jury views of the skull, head bones, spine and shoulder blades and testified that, although the plaintiff appeared in court with her back, side and neck supported by a leather harness, the injuries were not accompanied by a single fracture.

Recent Decisions of New Jersey Commission.—The Board of Public Utility Commissioners of New Jersey has ordered the Riverside Traction Company to transport members of the Township Committee and the township clerk of Bordentown Township free while traveling in the performance of their official duties. This was required by an ordinance of the township which had been accepted by the company, and it was the opinion of the board that this constituted an obligation which the company should fulfil. The board has, however, dismissed the application of the township of Bordentown to require the Riverside Traction Company to carry school children at a reduced rate of fare. It appeared that there was no obligation requiring transportation at the reduced rate, and nothing developed to show that the regular charge of the company was unreasonable.

Auto Traction Lines in Indiana.—Statistics for the auto bus lines in Indiana have just become available. During the last year twelve passenger automobiles carried 25,000 passengers between Greenfield, on the Indianapolis & Eastern Traction Company's line, and Maxwell, on the Indianapolis, New Castle & Toledo Electric Railway. The company which operates this line has been charging a fare of 3½ cents per mile for round-trip tickets, 4 cents a mile for one-way tickets and 5 cents a mile cash fare. The Shelbyville & Edenburg Auto Traction Company has been operating about eleven months between Shelbyville, Edenburg and Nineveh. One car is used and makes two round trips a day. This company expects to extend its line in the spring. No attempt has been made to operate during the winter months. The right of such companies to the use of pikes free will be decided by the courts.

Personal Mention

Mr. Charles A. Prouty, of the Interstate Commerce Commission, has been unanimously elected chairman of the commission for the ensuing year to succeed Judson C. Clements.

Mr. J. R. C. Armstrong has resigned as engineer of the New York (N. Y.) Railways Company, effective on Feb. 1, 1912. Mr. Armstrong has not announced his future plans.

Mr. H. G. Matthews, assistant to the president of the Quebec Railway, Light & Power Company, Quebec, Can., has been appointed general manager of the company, vice Mr. C. E. A. Carr, resigned.

Mr. L. E. Myers, of the L. E. Myers Company, Chicago, Ill., and vice-president of the Green Bay (Wis.) Traction Company, has been elected president of the Marquette County Gas & Electric Company, Ishpeming, Mich.

Mr. C. H. Crooks, general manager of the Fort Dodge, Des Moines & Southern Railroad, Boone, Ia., has assumed the duties of vice-president of the company, Mr. H. U. Wallace having resigned. A biography of Mr. Crooks was published in the Electric Railway Journal of Oct. 21, 1911.

Mr. W. T. Woodroofe, who has been connected with the British Columbia Electric Railway Company, Vancouver, B. C., for a number of years, and has recently been superintendent of power and lines, has been chosen by the Vancouver City Council city electrician, vice J. F. McCrossan, deceased.

Mr. Frederick W. Whitridge, who was receiver of the Third Avenue Railroad, New York, N. Y., was formally elected president of the Third Avenue Railway, the successor company, on Jan. 11, 1912. A biography and a portrait of Mr. Whitridge were published in the Electric Railway Journal of Jan. 6, 1912.

Mr. E. F. Peck, who has just been elected president of the firm of Allen & Peck, Inc., was one of the pioneers in the electric railway and lighting industry. He is a native of New Britain, Conn., where he was born in 1861. His first connection with the electrical business was in 1880, when he joined the American Electrical Company, which was then located in New Britain. This company subsequently became the Thomson-Houston Electric Company, and Mr. Peck installed a number of its first electric lighting plants, as in Boston, Fall River, Lynn, Mass.; St. Louis, Mo., and Brooklyn, N. Y. He also had charge of the early exhibits of the company at different national expositions. In 1885 he became general manager of the Citizens' Electric Illuminating Company, Brooklyn, N. Y., and in 1899 of the Kings County Electric Light & Power Company, Brooklyn. He resigned this position in 1902 to become general manager of the Schenectady Railway, which position he still occupies. During Mr. Peck's management this company has developed very extensively, and a few years ago it was purchased jointly by the New York Central & Hudson River Railroad and the Delaware & Hudson Company. Mr. Peck has taken prominent part in association affairs, and in 1909-10 he was president of the Street Railway Association of the State of New York.

E. F. Peck

Mr. Robert I. Todd, vice-president and general manager of the Indianapolis Traction & Terminal Company, and vice-president of the Terre Haute, Indianapolis & Eastern Traction Company, has been elected president of these companies to succeed the late Hugh J. McGowan. Mr. Todd was born at Lakewood, N. J., on Nov. 29, 1860, and was graduated from Johns Hopkins University in 1893. He has been engaged in street railway work for eighteen years, and has in turn been connected with the Eckington & Soldiers' Home Railway and the Belt Railway, Washington; Consolidated Traction Company, Pittsburgh; Cincinnati (Ohio) Traction Company; United Gas Improvement Company, and the street railways in Providence, R. I., now controlled by the Rhode Island Company.

Mr. C. Loomis Allen, whose firm, Allen & Peck, Inc., has just purchased the public utility properties at Old Point Comfort, Va., and has announced plans for embarking in the management of public utilities elsewhere, has taken a very prominent part in the operation of electric railway properties and in association affairs. Mr. Allen is at present vice-president and general manager of the system of city and interurban railways centering in Syracuse and controlled by the New York Central & Hudson River Railroad. These properties comprise the Utica & Mohawk Valley Railway, the Syracuse Rapid Transit Railway, the Oneida Railway, and others. He has been engaged in electric railroading since 1895 and for the most part in Syracuse, where, in fact, he began his electric railway career as civil engineer of the Syracuse city system. In 1898 he was promoted to the office of assistant general manager and a year later he became general manager of the system. In 1900 he resigned to become general manager of the Lorain (Ohio) Street Railway, but in the following year he returned to Central New York to become general manager of the Utica & Mohawk Valley Railway when that property was purchased by Mr. Horace E. Andrews and Mr. J. J. Stanley, Cleveland. In 1906 the Syracuse Rapid Transit system was acquired by the same interests and Mr. Allen was appointed manager of the combined properties. In addition to his operating duties Mr. Allen has served on many important committees of the national and state associations. He was the first president of the American Electric Railway Transportation & Traffic Association, and he was president in 1904 of the Street Railway Association of the State of New York. He is now third vice-president of the American Electric Railway Association.

C. L. Allen

OBITUARY

Richard T. Crane, president of the Crane Company, Chicago, died suddenly at his home in Chicago on Jan. 8, 1912. Mr. Crane was born in Paterson, N. J., in 1832, and worked in machine shops in Paterson, New York and Brooklyn, N. Y., until he was twenty-three years old, when he moved to Chicago. He started a brass foundry. His brother, Charles S. Crane, subsequently joined him, and the machine-manufacturing company of R. T. Crane & Brother was formed. This concern later grew into the Northwestern Manufacturing Company, and after that into the Crane Brothers Manufacturing Company, from which it evolved into the Crane Company.

H. C. McJilton, of the United Railways & Electric Company, Baltimore, Md., died suddenly at his home in Baltimore on Jan. 8, 1912, from heart failure. Mr. McJilton had been connected with the United Railways & Electric Company for more than twenty years, first as bookkeeper for the Baltimore Traction Company, then as auditor for the Baltimore Consolidated Railway. When the Baltimore Traction Company and the City & Suburban Railway were consolidated he was appointed secretary-treasurer of the consolidated company, and later, when all the companies in Baltimore were consolidated, he was appointed secretary-treasurer, which position he held until the latter part of 1906, when the position of secretary-treasurer was separated into those of secretary and treasurer. This change permitted Mr. McJilton to give his entire attention to the accounting system and accounting force of the company. At the time of his death Mr. McJilton was statistician of the company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Central Illinois Railway, Aurora, Ill.**—Incorporated in Illinois to build an electric railway from Chicago, Ill., to Muscatine, Ia. Headquarters Aurora. Capital stock $25,000. Incorporators: George E. Ackerman, Kaneville; John M. Raymond, Aurora; William E. Williamson, Marseilles; Henry H. Hoganson, Seneca, and Nels A. Fruland, Ottawa.

Keokuk, Nauvoo & Fort Madison Railway, Nauvoo, Ill.—Incorporated with a capital stock of $650,000 to construct an electric railway from Keokuk, Ia., to Fort Madison, with branch lines to Nauvoo and Carthage, Ill. The principal office is at Nauvoo. Incorporators: William H. Fisher, Charles H. Petsch, Frederick M. Carlin, Edward J. Meier and William H. Canby.

***Pacific Northwestern Traction Company, Seattle, Wash.**—Incorporated in Washington as successor to the Seattle-Everett Interurban Railway, Seattle, and the Bellingham-Skagit Railway, Bellingham. Capital stock, $3,500,000.

FRANCHISES

Mobile, Ala.—The Mobile-West Shore Traction Company, Mobile, has asked the City Commissioners for a franchise in Mobile. This proposed electric railway will connect Mobile, Alabama Port, Coden, Bayou la Batre and Pascagoula, Miss. H. Austell, Mobile, president. [E. R. J., Nov. 25, '11.]

Tempe, Ariz.—The Salt River Valley Electric Railway, Phoenix, has asked the City Council for a franchise along Mill Avenue in Tempe. It will connect Phoenix, Scottsdale, Tempe, Mesa City, Chandler, Alhambra, Glendale and Peoria, a distance of 60 miles. F. M. Winter, Phoenix, president. [E. R. J., Dec. 30, '11.]

Oakland, Cal.—The Oakland Traction Company has received a fifty-year franchise from the Board of Supervisors for an extension along Arlington road in Oakland from the northern boundary line of Berkeley to the county line.

Santa Clara, Cal.—The Peninsular Railway has asked the Board of Town Trustees for a franchise over certain streets in Santa Clara to the city limits, where it will connect with the line that is to extend along the Saratoga Road.

San Diego, Cal.—The San Diego Electric Railway has received a fifty-year franchise from the City Council to extend its lines in San Diego.

Oak Park, Ill.—The Chicago & Oak Park Elevated Railroad, Chicago, has received one month's extension of its franchise to complete work on the elevation of its tracks in Oak Park.

Urbana, Ill.—The Kankakee-Urbana Traction Company, Urbana, has received a forty-seven-year franchise from the City Council, on North Cunningham Avenue, in Urbana. The line will connect Kankakee, Urbana, Camargo and Charleston. [E. R. J., Aug. 12, '11.]

West Marion, Ind.—The Indiana Union Traction Company has received permission from the Board of Public Works and will ask the City Council for a franchise to extend its line in West Marion to the factory district.

Covington, Ky.—The Cincinnati, Newport & Covington Light & Traction Company, Covington, will ask the City Council for an extension of its franchise in Covington.

St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company has received a franchise from the City Council over South Eleventh Street in St. Joseph.

Bloomfield, N. J.—The Public Service Railway, Newark, has asked the Town Council for a franchise to double track the Orange & Passaic Valley line along Glenwood Avenue from Bloomfield Centre to a point below Henry Street in Bloomfield.

Catskill, N. Y.—The Catskill Traction Company has received permission from the Public Service Commission, Second District, to construct an extension from Leeds to Cairo, 7 miles.

Dilworth, N. D.—The Fargo & Moorland Street Railway, Fargo, has asked the City Council for a franchise in Dilworth.

***Minot, N. D.**—L. J. Palda, Jr., James Johnson, Joseph Roach and A. J. Brunner have asked the City Council for a twenty-year franchise in Minot.

Kingsbury, Ohio.—John L. Cannon, representing the Cleveland, Youngstown & Eastern Railway, has asked the City Council to act on the company's petition for a franchise in Kingsbury.

Newberg, Ore.—The Oregon Electric Railway, Portland, has received a franchise from the Council on First Street.

Portland, Ore.—The Portland Railway, Light & Power Company has asked the Council for a franchise for a double track line on Sixth Street from Burnside to Washington in Portland.

Toronto, Ont.—Application will be made by the Toronto Suburban Railway to the Legislature of the Province of Ontario at its next session for an act authorizing the company to extend its line from Guelph to Berlin, Preston, Hespeler, Galt and Hamilton.

Point, Pa.—The Sunbury, Lewisburg & Milton Railroad, Sunbury, has received permission from the Supervisors of Point to extend its line over private ground through Point.

Scranton, Pa.—The Scranton & Lake Ariel Railway, Scranton, has asked the City Council for a franchise in Scranton. This 20-mile electric railway will connect Lake Ariel and Scranton. [E. R. J., Nov. 4, '11.]

Seattle, Wash.—The Puget Sound Electric Company, Tacoma, has asked the Board of County Commissioners for a franchise over County Road No. 80 and other streets in the vicinity of Kent and Auburn.

Stevens Point, Wis.—The Chicago & Wisconsin Valley Railroad, Madison, has asked the City Council for a franchise in Stevens Point. It will connect Janesville, Friendship, Easton, Portage, Lodi, Wausau, Stevens Point, Madison and Merrill. Allen T. Russell, Chicago, general manager. [E. R. J., Jan. 6, '12.]

TRACK AND ROADWAY

Ft. Smith Light & Traction Company, Ft. Smith, Ark.—This company will construct 5 miles of new track during 1912. Two lines will be built; one from Ft. Smith to Van Buren, and one from Ft. Smith to South Ft. Smith.

Little Rock Railway & Electric Company, Little Rock, Ark.—Plans are being considered by this company for the construction of an extension from Pulaski Heights to the Highland Park line.

***Pacific Improvement Company, Pacific Grove, Cal.**—This company will build an electric railway from Pacific Grove to Pebble Beach. A clearing of the right-of-way through the Seventeen-Mile Reservation from Lake Majela is now being made. Power will be furnished from the power house at Del Monte. The Southern Pacific Railroad tracks will be used from Pacific Grove to Lake Majela and the line will be constructed from Lake Majela to Pebble Beach, a distance of about 3 miles. A. D. Shepard, Pebble Beach, general manager.

San Diego (Cal.) Electric Railway.—About 10 miles of second track will be constructed by this company in San Diego during 1912.

Pike's Peak Aerial Railway, Manitou, Col.—Construction will be begun at once on this aerial passenger railway from Manitou to the summit of Pike's Peak. The company has been organized with a capital stock of $1,000,000. The board of directors follows: J. Mignolet, E. C. Healy and E. Yoxal. [E. R. J., Nov 25, '11.]

Shore Line Electric Railway, Saybrook, Conn.—This company expects to complete its 5-mile extension between Ivoryton and Deep River by May 1.

Waycross Street & Suburban Railway, Waycross, Ga.—Work has been begun by this company on its line in Waycross. It will connect Hebardville, Deenwood, Winona Park, Waresboro and Waycross. George W. Deen, Waycross, president. [E. R. J., Dec. 1, '11.]

Kankakee-Urbana Traction Company, Urbana, Ill.—This company will open bids for grading the right-of-way between Urbana and Rantoul, via Thomasboro, on Jan. 30,

and bids for purchase of ties on Feb. 1. Bids have been asked on concrete work and bridges. The company authorized G. M. Bennett, president, to arrange for the purchase of rails and other material including overhead equipment. [E. R. J., Aug. 12, '11.]

Evansville (Ind.) Railways.—During the next few weeks this company will award contracts for line material to electrify 7 miles of the Illinois Central Railroad tracks between Evansville and Henderson, Ky.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—The board of directors of this company, in addition to the original route planned for the Cincinnati extension, which passed through Connersville to Hamilton, have determined to include two routes and have ordered surveys of these routes made. The first is from Greensburg to Batesville and Harrison, Ohio, thence to Cincinnati, and the second is from Rushville to Brookville and Harrison, and thence to Cincinnati.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company has placed in operation the extension of its Michigan Street line in Indianapolis.

Indiana & Ohio Interurban Railroad, Rising Sun, Ind.—This company, which has incorporated to build a 9½-mile electric railway between Rising Sun and Aurora, has elected the following officers: Lucian Harris, president; J. W. Whitlock, vice-president; James N. Perkins, secretary. [E. R. J., Jan. 13, '12.]

South Bend & Logansport Traction Company, South Bend, Ind.—This company has finished the construction of its bridges, and the grading and the laying of rails will be begun as soon as the weather permits on the section of its line between Plymouth and South Bend.

Frankfort & Owenton Traction Company, Frankfort, Ky.—Articles of incorporation have been prepared and it is probable that definite organization toward the construction of an electric railway between Frankfort and Owenton will be effected in the immediate future. Negotiations are being made with capitalists of Louisville toward the financing of the project. Charles Strother, Owenton, is interested. [E. R. J., May 28, '10.]

Louisville (Ky.) Railway.—This company has bid in two franchises known as the "cross-town ordinance" and the "Bardstown road ordinance." The cross-town franchise provides for the construction of a line through the central southern residential portions of Louisville. The Bardstown franchise provides for the construction of a line extending half a mile from Bonnycastle Avenue to the new city limits. The cross-town line will be 7 miles long. The company will begin work upon the new lines as soon as the weather permits.

***Shawmut, Maine.**—Surveys have been begun by C. H. Barron for a line between Shawmut and Skowhegan, a distance of between 15 and 16 miles. The promoters are said to be the same as those controlling the Fairfield & Shawmut Railway, Fairfield.

Worcester (Mass.) Consolidated Street Railway.—Plans have been completed by this company for the expenditure of $2,500,000 in extensions and improvements of its lines in Worcester and Worcester County. This includes a 25-mile extension through Paxton, Rutland, Coldbrook and Barre to Petersham.

***Clayton, N. M.**—J. A. Margo, Boise City, Okla., and associates plan to build a 120-mile electric railway from Guymon, Okla., to Clayton, N. M.

Brooklyn (N. Y.) Rapid Transit.—This company has awarded the contract for a steel and concrete highway bridge crossing the Brighton Beach line at Lincoln Place, Brooklyn.

Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y.—This company has been asked to consider plans for the construction of a belt line through the southern part of Oswego.

Stark Electric Railroad, Alliance, Ohio.—It is reported that this company has begun work on Vine Street in Alliance on the Alliance-Ravenna line to Bolton.

Cincinnati (Ohio) Traction Company.—Approximately 7000 ft. of new track will be constructed by this company in Cincinnati during 1912.

Ohio Electric Railway, Cincinnati, Ohio.—Plans are being made by this company to build an extension to Prospect Hill, Hamilton.

Portsmouth Street Railway & Light Company, Portsmouth, Ohio.—This company plans to extend its Sciotoville Street line to Wheelersburg in the spring.

El Reno (Okla.) Interurban Railway.—Plans are being considered by this company for an extension between El Reno and Woodward.

Sand Springs Interurban Railway, Tulsa, Okla.—During 1912 this company will construct 1 mile of new track.

Toronto (Ont.) Railway.—Between 10 and 15 miles of new track will be built by this company during 1912.

***Toronto, Ont.**—Plans are being made for the construction of a 3-mile electric railway to serve a portion of the suburban district around Toronto. It will have Lambton and Sunnyside as its terminals.

Bangor & Portland Traction Company, Bangor, Pa.—This company plans to build a cut-off from its line at Mt. Bethel to a point just north of Portland, on the Stroudsburg, Water Gap & Portland Electric Railway. This cut-off will save about 3 miles on the Liberty Bell route to the Delaware Water Gap.

Cumberland Railway, Carlisle, Pa.—Plans are being considered by this company to build a 22-mile extension between Newville and Chambersburg.

West Side Electric Street Railway, Charleroi, Pa.—A 9-mile extension between Charleroi and Bentleyville will be built by this company during 1912.

Pennsylvania & Maryland Street Railway, Elk Lick, Pa.—Plans are being considered by this company for an extension from Garrett to Somerset.

Indiana County Street Railway, Indiana, Pa.—This company plans to build an extension from the Blairsville depot in Blairsville to Blairsville Intersection, a distance of 3 miles.

Johnstown (Pa.) Traction Company.—Plans are being considered by this company for an extension from Walnut Grove to Geistown and from Geistown to Moxham.

Middletown & Elizabethtown Street Railway, Middletown, Pa.—Promoters of this company are considering a change of route that will take the line through Royalton, via the new Aqueduct Bridge. They have not yet secured right-of-way through Middletown and Elizabethtown. M. K. Blaugh, Elizabethtown, president. [E. R. J., Oct. 21, '11.]

Beaver Valley Traction Company, New Brighton, Pa.—This company will soon rebuild 1 mile of new track.

Citizens' Traction Company, Oil City, Pa.—Plans are being made by this company for an extension of its line from Franklin to Butler. The route from Franklin to Butler is not disclosed, but it is intimated that it will connect Clintonville and several towns in the northern part of Butler County.

Waynesburg & Blacksville Street Railway, Waynesburg, Pa.—Work will be resumed on the 6-mile section of this line from the double bridge near Morrisville to a point near Brant Summit, by the Bardella Construction Company, Fairmont, as soon as the weather permits.

Moose Jaw (Sask.) Electric Railway.—About 5 miles of new track will be built by this company during 1912.

***Olivet (S. D.) Interurban Railroad.**—This company is being organized to build an electric railway from Olivet to Tuscan. Right-of-way has been secured.

Sioux Falls (S. D.) Traction System.—About 2 miles of new track will be built by this company during 1912.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company will construct 2 miles of new track during 1912.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.—Work has been begun by this company on its 1-mile extension into the Segrest Addition on South Bluff.

Mission, Tex.—Grading has been begun for the 15-mile electric railway from Mission to Monte Cristo. The route to be followed will be along the immediate river front between the Rio Grande River and the Sam Fordyce

branch of the St. Louis, Brownsville & Mexico Railway, extending from San Benito to Monte Cristo. S. Robertson, San Benito, is interested. [E. R. J., Dec. 1, '11.]

Rutland Railway, Light & Power Company, Rutland, Vt.—A 10-mile extension between Poultney, Vt., Granville, N. Y., and West Pawlet, Vt., will be built by this company during 1912.

South Morgantown Traction Company, Morgantown, W. Va.—Preliminary surveys will be begun at once by this company on its extension in Greenmont and South Park. Contracts for the ties and rails will be placed some time this month.

Union Utilities Company, Morgantown, W. Va.—During 1912 this company expects to build 2½ miles of new track from Morgantown to Dellsboro.

SHOPS AND BUILDINGS

Los Angeles (Cal.) Railway.—This company plans to build a new carhouse on South Grand Avenue in Los Angeles.

Pacific Electric Railway, Los Angeles, Cal.—It is reported that this company will build new repair shops at Dominguez, about 13 miles from Los Angeles.

Des Moines (Ia.) City Railway.—Work will be begun this year on the company's new passenger and freight terminal station in Des Moines. The cost is estimated to be about $320,000.

Central Kentucky Traction Company, Frankfort, Ky.—This company has completed its new depot in Versailles. The structure contains two waiting rooms, a ticket and freight office and an office room, which will be occupied by the Versailles Electric Light Company.

Worcester (Mass.) Consolidated Street Railway.—This company has awarded the contract for surveys for its new express station in Worcester to Durkee, White & Towne, Springfield. The structure will be one story high and approximately 100 ft. x 300 ft.

Orange County Traction Company, Newburgh, N. Y.—Plans are being considered by this company to rebuild its carhouse and office, destroyed by fire on Jan. 4.

Niagara Gorge Railroad, Niagara Falls, N. Y.—This company expects to build a new concrete carhouse during 1912.

Ohio Electric Railway, Cincinnati, Ohio.—This company has opened its new interurban terminal station at Rich Street and Third Street in Columbus.

Beaver Valley Traction Company, New Brighton, Pa.—An addition will soon be built by this company to its carhouse at Rochester.

Greenville, Spartanburg & Anderson Railway, Anderson, S. C.—This company has awarded contract to build a depot in Anderson to cost $20,000 and a depot in Greenville to cost $20,000 to the Goode Construction Company, Charlotte, N. C. The railway company has also awarded contracts to the Williams-Moffatt Construction Company, Durham, N. C., to build depots at Piedmont, Pelzer, Hodges, Donalds, Honea Path and Belton, S. C., to cost $8,000 each.

POWER HOUSES AND SUBSTATIONS

Cairo Electric & Traction Company, Cairo, Ill.—This company will build a brick and concrete addition to its power plant and will install additional equipment. The improvement will cost about $60,000.

Evansville (Ind.) Railways.—During the next few weeks this company will purchase equipment for its new substation at Henderson, Ky.

Worcester (Mass.) Consolidated Street Railway.—Among the improvements planned by this company during 1912 will be a $500,000 development of its power station at Milbury.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company has bought a 2,000-kw turbo-generator from the General Electric Company and expects to purchase a jet condenser and to install a pipe line at its power house in Gulfport.

Oklahoma City (Okla.) Railway.—During the next six weeks this company may purchase storage tanks for oil, oil pumps and a 100,000-gal. capacity tank.

Hull (Que.) Electric Company.—This company has placed an order with the Canadian General Electric Company for one 250-kw motor generator set.

Manufactures and Supplies

ROLLING STOCK

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., expects to purchase two new freight cars.

Massachusetts Northern Railways, Greenfield, Mass., is reported to be considering the purchase of twelve open cars.

Arkansas Valley Railway, Wichita, Kan., expects to purchase five passenger cars, five trailers and one freight far during 1912.

Evansville (Ind.) Railways expects to purchase three 50-ft. combination passenger and baggage cars and one 47-ft. freight car.

East St. Louis & Suburban Railway, East St. Louis, Ill., has ordered one 50-ft. closed interurban car from the St. Louis Car Company.

Rochester & Manitou Railroad, Rochester, N. Y., has ordered three 46-ft. 3½-in. open motor car bodies from the G. C. Kuhlman Car Company.

East St. Louis (Ill.) Railway has ordered four GE-219 split-frame motor equipments with KO-35 controllers from the General Electric Company.

Cincinnati & Portsmouth Railway, Cincinnati, Ohio, has ordered two K-37 controllers from the Westinghouse Electric & Manufacturing Company.

Charleston Consolidated Railway & Light Company, Charleston, S. C., expects to add six single-truck pay-within cars to its rolling stock this year.

Richmond & Henrico Railway, Richmond, Va., will order twenty-five prepayment cars during 1912, providing the city grants the company certain extensions.

Geary Street Municipal Railway, San Francisco, Cal., through the board of public works of that city, will call for new bids for forty-three new cars for the municipal line.

Orange County Traction Company, Newburgh, N. Y., is reported to have ordered four double-truck and ten single-truck cars from the McGuire-Cummings Manufacturing Company.

San Francisco, Oakland & San José Railway, San Francisco, Cal., expects to order thirty-five composite coaches for heavy electric service and three 60-ton locomotives during 1912.

Butte, Anaconda & Pacific Railway, Butte, Mont., which is a branch of the Chicago, Milwaukee & St. Paul Railway, has ordered fifteen 75-ton 2400-volt electric locomotives from the General Electric Company.

Reading (Pa.) Transit Company has ordered ten 30-ft. 8-in. semi-convertible motor car bodies mounted on Brill 27-MCB-1 trucks and ten 30-ft. 8-in. semi-convertible motor pay-as-you-enter car bodies mounted on Brill 39-E trucks from The J. G. Brill Company. The cars are to be equipped with Westinghouse No. 306 motors and HL control.

Bay State Street Railway, Boston, Mass., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 6, 1911, as having ordered fifty new cars from the St. Louis Car Company, ordered these cars through Wendell & MacDuffie Company, its Eastern representatives. The order calls for thirty 28-ft. semi-steel closed car bodies, twelve fourteen-bench car bodies and eight twelve-bench car bodies, to be mounted on St. Louis trucks.

TRADE NOTES

Grip Nut Company, Chicago, Ill., has appointed D. F. Lillis its Eastern sales agent with headquarters in New York.

Baldwin Locomotive Works, Philadelphia, Pa., has purchased from the East Chicago Company 370 acres of land at Calumet, a part of the East Chicago district, and will build a large plant on the site.

Universal Safety Tread Company, Boston, Mass., has opened a new office at 200 Fifth Avenue, New York, N. Y., in charge of H. F. Stevenson. This takes the place of the company's former office at 50 Church Street.

C. E. Knickerbocker, New York, N. Y., has become connected with the MacDonald Construction Company,

New York, in charge of railway construction. Mr. Knickerbocker was formerly chief engineer of the New York, Ontario & Western Railroad.

Kelman Electric & Manufacturing Company, Los Angeles, Cal., has moved into its new building at 1650 Naud Street, Los Angeles. The company was obliged to secure a factory with increased facilities owing to the demand for its oil switches for high-voltage work.

Staunton Dielectrite Rubber Company, Muskegon, Mich., manufacturer of molded insulation for high and low tension and a number of other rubber compound products, announces a change in the firm name to Vulcanized Products Company. The company's material called Dielectrite will be renamed Gohmak.

Habirshaw Wire Company, Yonkers, N. Y., has elected Richard Sherwood Satterlee president of the company. Mr. Satterlee has been connected with the Habirshaw interests for ten years, and for several years past has been second vice-president and a member of the board of trustees of that company.

Dossert & Company, New York, N. Y., report a large increase in the export of Dossert specialties. Recent orders have been received from Ecuador, Cuba, Montego Bay, Jamaica, and Sao Paulo, Brazil. Harry B. Logan, president of the company, sailed from New York on Jan. 17 on a trip to the West Indies, Central America and the Panama Canal.

Galena-Signal Oil Company, Franklin, Pa., on Jan. 3, 1912, elected the following officers for the ensuing year: General Charles Miller, chairman of the board; S. A. Megeath, president and general manager; C. C. Steinbrenner, vice-president; E. H. Baker, second vice-president; E. H. Sibley, treasurer; J. French Miller, secretary; G. F. Proudfoot, assistant secretary.

Wonham, Sanger & Bates, New York, N. Y., report the receipt of recent orders for H-B life guards from the following companies: Eighty guards for Brooklyn Rapid Transit Company, 100 sets for Montreal Street Railway, forty guards for People's Railway, twelve guards for Pueblo & Suburban Traction & Light Company, and fifty guards for Sao Paulo Tramway, Light & Power Company.

McClintic-Marshall Construction Company, Pittsburgh, Pa., has closed a contract with the New York Connecting Railroad for the steel work for the approaches to the East River Bridge on Long Island, Randall's Island and in the Bronx. The American Car & Foundry Company has made a contract with the McClintic-Marshall Construction Company for an extension to its plant in Chicago.

American Carbon & Battery Company, St. Louis, Mo., lost one of its main buildings in a fire at its plant in St. Louis recently. The loss was covered by insurance. Enough finished and semi-finished material is in stock to supply the company's trade until the plant is rebuilt. Temporary quarters have been arranged and all orders are being filled promptly. The carbon plant will be rebuilt at once.

American Brake Shoe & Foundry Company, Mahwah, N. J., reports net earnings for the year ended Sept. 30, 1910, as $1,028,808, a decrease of $34,861 from 1910. The surplus for dividends was $989,266, and after the payment of 7 per cent on both issues the balance remaining was $457,267. The report states that there was an increase during the year in plant investment account of $306,604 for real estate, building, machinery and equipment. Of this amount $196,000 was expended on the new Chicago plant.

Continuous Rail Company, New York, N. Y., owner of the Romapac rail system, calls attention to the type of construction used under the Romapac rails, described in the issue of this paper for Dec. 23. The article stated that the rails were laid on steel ties "with 8 in. of rolled crushed rock ballast under the ties." This is correct as regards the section of track from Thirty-first Street to Thirty-fifth Street. South of Thirty-fifth Street the railway had planned to use type No. 1 construction (that is, steel ties embedded in concrete), and the rails were laid on blocking, lined and surfaced. Cold weather set in, making concrete unsafe, so the company resorted to the use of crushed limestone ballast. This was filled in around the ties, thoroughly tamped, and then the blocking was removed. It has been the practice of this company to roll ballast before laying the track, but this method was impossible in this case without considerable delay and additional expense, as the track had already been laid with the new rail.

George W. Jackson and E. A. Clark, Chicago, Ill., announce the formation of a consulting engineering firm with offices at 756 West Jackson Boulevard, Chicago, and 228 West Forty-second Street, New York. The new firm is entirely separate from George W. Jackson, Inc. Mr. Clark was general manager, having charge of the design and estimating of the bridge and structural-steel department for George W. Jackson, Inc., from 1906 to 1911, when he became manager of the Chicago office for Waddell & Harrington, Kansas City, consulting engineers. He is a graduate of Purdue University and gained his early experience with the Lane Bridge & Iron Works, the Joliet Bridge & Iron Company, the Wisconsin Bridge & Iron Works and the American Bridge Company. For four years he was chief engineer for the Jackson & Corbett Bridge & Steel Works, Chicago. Mr. Jackson's experience in heavy construction in Chicago and elsewhere, including the Illinois Telephone Company's tunnels and the water supply intake tunnels, is well known.

ADVERTISING LITERATURE

Duplex Metals Company, Chester, Pa., is mailing a circular which calls attention to its copper-clad wire.

National Tube Company, Pittsburgh, Pa., has issued N. T. C. Bulletin No. 7, which describes and illustrates the company's regrinding valves.

Canton Culvert Company, Canton, Ohio, is distributing an illustrated folder, printed in Spanish, on its Acme nestable corrugated No-Co-Ro metal culverts.

Perry, Coffin & Burr, Boston, Mass., have reprinted in pamphlet form from the Boston *Herald* an article about the Bay State Street Railway entitled "The Largest Street Railway System in the World," in connection with their offering of bonds of the Boston & Northern Street Railway and the Old Colony Street Railway.

Stone & Webster Engineering Corporation, Boston, Mass., has issued a booklet on the new Riverside power station and system in Minneapolis, which it designed and built for the Minneapolis General Electric Company. The illustrations show the progress made on the construction of the plant at various dates. The old steam-power plant of the Minneapolis General Electric Company was destroyed by fire early in January, 1911, and the city was deprived of electric service. On Feb. 27, 1911, ground was broken by the engineering company and on July 18, 1911, the station was ready to deliver power from turbine No. 1. The plant complete was turned over to the operating company on Sept. 7, 1911.

NEW PUBLICATIONS

Short Course in the Testing of Electrical Machinery. By J. H. Morecroft and F. W. Hehre. New York, 1911: D. Van Nostrand Company. Cloth. 154 pages. Price, $1.50 net.

The authors state that this laboratory manual was prepared for the engineering and chemistry students of Columbia University whose courses require only a working knowledge of electrical machinery. The principal merit of this book lies in its short and simple explanations of the electrical characteristics of different classes of d.c. and a.c. apparatus.

Yellow Pine. The Yellow Pine Manufacturers' Association, St. Louis, 1911. Paper, 96 pages. Price, 50 cents per single copy and 25 cents each in lots of six or more.

This is a manual of standard wood construction which presents many technical data on the physical properties of yellow pine, including tables relating to the strength of yellow-pine timbers of commercial sizes. The following, a few of the topics treated in this important work, are sufficient to indicate its broad scope: Formulas and tables for strength of beams, trussed beams, columns, floors and girders; building code regulations as to allowable fiber stresses per square inch; section moduli of standard sizes; classification and grading rules; physical properties of yellow pine and standard sizes for various purposes.